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ABSTRACT

Information about the performance of higher education graduates and how we can develop better performance indicators is limited. There is some information on aspects of the results of higher education from synthesis of small scale research projects, from standardized tests, and from national surveys. There are also efforts underway to design an indicator system that would track progress with regard to cognitive outcomes and literacy. A group appointed by the National Education Goals Panel has recommended that a new assessment system be created for higher education modeled on the existing one for elementary and secondary education, the National Assessment of Educational Progress. Some preliminary work has been done in identifying indicators of good practice. The question is now whether efforts to secure better information can reach consensus in the higher education community. An important element of any indicator system must be the academic performance of college graduates in some set of content and skill disciplines. Consensus around skills, centering on communications, critical thinking, and problem solving, is more likely than consensus on content knowledge. A number of example tasks are presented as potential measurement techniques. Twenty-three figures illustrate the discussion. (SLD)

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Learning by Degrees

INDICATORS OF PERFORMANCE IN HIGHER EDUCATION

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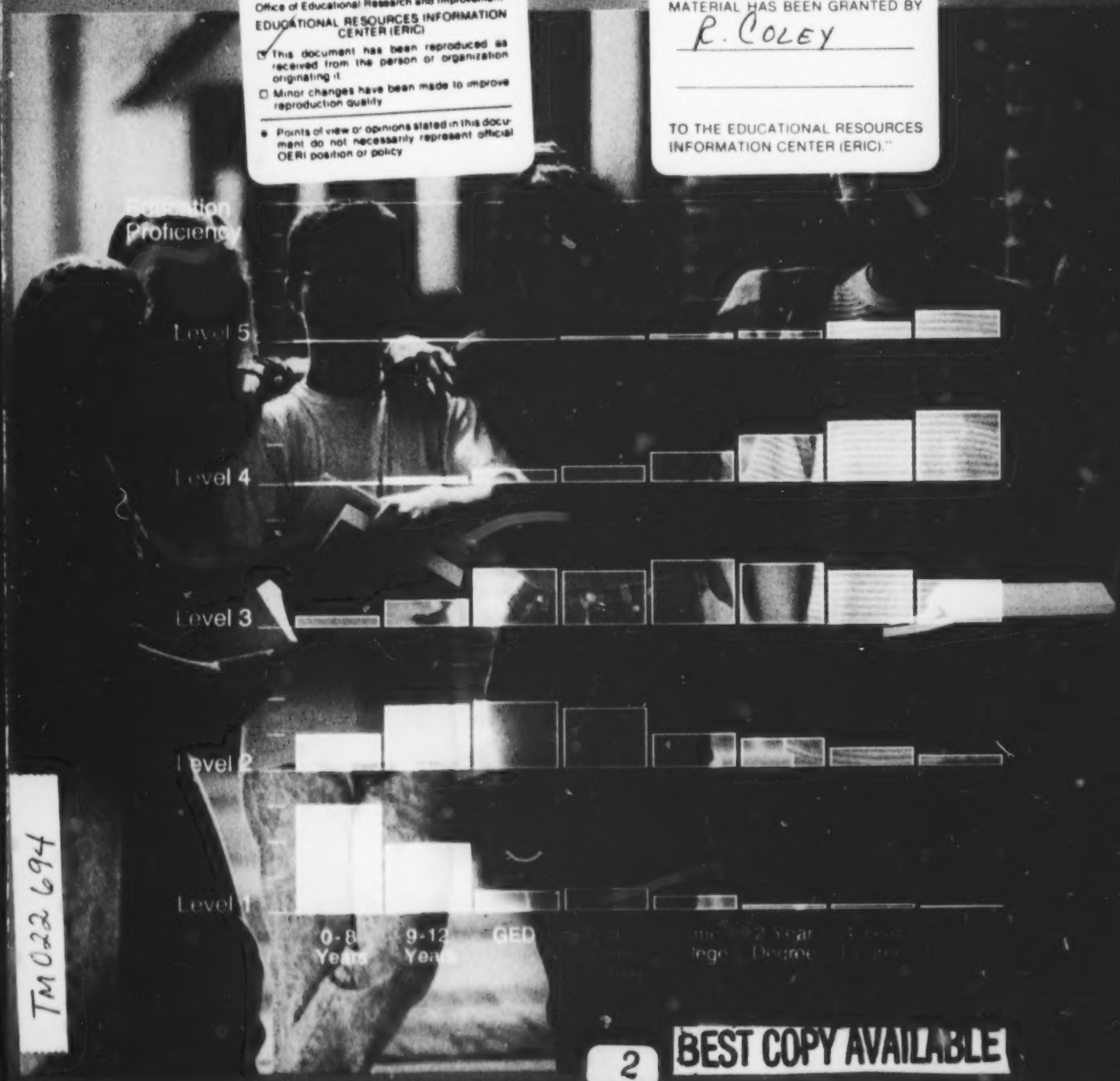

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Learning by Degrees

Indicators of Performance in Higher Education

by

Paul E. Barton

and

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PREFACE

I am pleased to join with Archie Lapointe, Director of the Center for the Assessment of Educational Progress at Educational Testing Service, in presenting this report on indicators of outcomes of higher education. Higher education is increasingly in the spotlight, as was elementary and secondary education in the 1980s. President Bush and the nation's governors set goals for higher education back in 1989, and while the National Education Goals Panel issues a report card on those goals each September, there are no data on whether we are moving toward the goal set for cognitive outcomes.

We set forth what is now known quantitatively about outcomes in what we intend to be a balanced and objective manner. And we describe how the available information could be greatly improved. While recommending expansion of quantitative measurement, we are also mindful of its limits in capturing all the varied and important purposes of higher education.

The "In Brief" section boils down the report for the hurried reader. The "Summary and Highlights" section is a precis of the entire report. This results in some repetition for the person who reads the whole report, which starts with the "Introduction."

Paul E. Barton
Director

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One or the other of us have benefited from discussion of these issues with Russ Edgerton of the American Association for Higher Education, Robert Atwell of the American Council for Education, Donald Stewart and Janice Weinman of the College Board, and Robert Albright and Nancy Beck of Educational Testing Service.

Russ Edgerton gave us useful advice and information at the outset of the project. The manuscript was reviewed by Kay McClenney of the Education Commission of the States and by Peter Ewell and Dennis Jones of the National Center of Higher Education Management Systems. At Educational Testing Service the reviewers were Lynn Jenkins, Irwin Kirsch, Howard Wainer, and Richard J. Coley.

We thank all who gave advice and reviewed the manuscript. The authors are solely responsible for the contents of the report, and for occasional departures from advice received.

Richard J. Coley prepared the charts and graphs, Carla Cooper provided the desktop publishing, Nivedita S. Niyogi did the editing, Rick Bruce designed the cover, and Richard Class coordinated production.

Paul Barton
Archie Lapointe

IN BRIEF . . .

America's extensive and varied system of higher education is respected around the world. Indeed, it attracts students from around the world.

But pressures have been building on higher education over the last decade. Concerns about global competitiveness. Pinched public budgets. A general demand for education reform. Galloping tuition costs. The result: higher education is increasingly being asked to *show* what results it achieves — what students, parents, and the public are getting for their money. *Quantity* has certainly been achieved, but where do we stand on *quality*?

Do we have an information system that would answer that question? No, we certainly do not. This report is about the need for such a system, and about recent, though incomplete, work to bring it into existence.

Do we know *nothing* about the outcomes of a college education in America? No, that's not true either. However, the data available are limited, and were not designed or gathered specifically to be indicators of quality. We present what is known, but it adds up to a fragmentary and blurred picture.

The picture for four-year college graduates *who go on to graduate school* looks pretty good, in terms of recent trends. We know this from the results of the Graduate Record Examination (GRE). Quantitative and Analytical scores have risen over the last dozen years, even as the numbers going on to graduate school have risen sharply. Verbal scores remained basically level. In subject tests in their majors, graduates' average scores rose in eight subjects and fell in seven.

There have been many small-scale research studies of the outcomes of college, and a summary of 2,600 of them shows among other things that college has a positive effect on verbal and quantitative skills, oral and written communication, and critical thinking. We would be shocked if it were otherwise. This summary doesn't tell us what the *trends* are for such results.

How *literate* are college graduates? A national household assessment of adults in 1992 tells us a whole lot about this, using print materials dealing with prose, document, and quantitative tasks. They are certainly *more* literate, on average, than those who do not go to college, or do not graduate. But their *levels* of literateness range from a lot less than impressive to mediocre to near alarming, depending on who is making the judgment. In the final analysis, it is the *reader* who must make that judgment; there are no established standards of expectation here. We suggest these data need to be examined carefully, and the resulting message debated.

There are five levels of prose literacy; the fifth level is the highest. The bulk of four-year and two-year college graduates perform at Levels 3 and 4.

- The 35 percent of four-year graduates (and 41 percent of two-year graduates) in Level 3 can consistently do tasks such as writing a brief letter to explain a billing error or read a news article and identify a

sentence that provides an interpretation of a situation.*

- The 42 percent of four-year graduates (and 34 percent of two year graduates) at Level 4 can consistently perform tasks such as stating in writing an argument made in a lengthy newspaper article or contrasting the views expressed in two editorials on technologies available to make fuel-efficient cars.

- The fact remains that 11 percent of four-year graduates (and 21 percent of two-year graduates) *do not* reach Level 3 or 4. Most of these graduates are in Level 2, where they succeed at such tasks as interpreting the instructions from an appliance warranty or locating two features of information in a sports article. Among *young* four-year graduates, 8 percent are below Level 3.

- Relatively few reach the highest level, Level 5. Eleven percent of four-year graduates (and 4 percent of two-year graduates) are at this level, where sample tasks include summarizing two ways lawyers may challenge prospective jurors, and comparing the approaches stated in a narrative on growing up.

- Almost half — 47 percent — of four-year graduates (and 62 percent of two-year graduates) *do not reach Levels 4 and 5*. These levels are described in the report and complete examples of the tasks are provided (as they are for the other levels, as well).

*Percentages are for adults born in the U.S. and its territories.

Similar information is provided for quantitative tasks and tasks using documents. Over half of four-year graduates are below Levels 4 and 5 in quantitative proficiency and just under half in document proficiency. A representative quantitative task at Level 4 is using a pamphlet on eligibility to calculate the yearly amount a couple would receive for basic supplemental security income. A representative document task at this level is using a bus schedule to determine the appropriate bus to take for a given set of conditions.

There is a *broad distribution* of proficiency and achievement in the United States at any level of academic credentials, or any grade level in school, and these distributions overlap considerably. So it may not be terribly informative to talk about what *all* four-year graduates can do, as if there were something standard about what a college degree means in this nation. The top 25 percent of high school graduates do better than the bottom 25 percent of four-year college graduates. But a graduate from what kind of college, from what kind of high school, and from what kind of socioeconomic background? A monitoring system needs to answer these questions to be used and to be useful.

For college graduates, the levels of literateness they achieve are directly related to their success in the labor market. The higher the average levels of literacy, the higher the average weekly wages, and the greater the average number of weeks worked during the year.

Periodically, information is available about the outcomes of college in terms of the labor market status of four-year graduates a year after they leave school. Average salaries have been fairly flat

since 1976. Of course, they vary considerably by major. There is also considerable variation by major in whether degree recipients are working in their fields, in whether they have jobs that require a four-year degree, and in whether they enroll in further education. We summarize this information in the report. We think these data, produced by the National Center for Education Statistics, should be more extensively available, and in forms students and counselors could use to inform choices about fields of study.

Do we need better, more comprehensive, information about the outcomes of higher education? We believe that we do. There is a concern about quality and whether it is going up or going down. The data now available are not equal to the task of measuring levels and trends.

The National Education Goals, announced by President Bush and all the governors in 1989, provide a clear starting point. They called for a substantial increase in the proportion of college graduates "who demonstrate an advanced ability to think critically, communicate effectively, and solve problems." The Goals Panel recommended a *sample-based*, national assessment system to measure progress toward this goal, a system similar to what we have had for a quarter century for elementary and secondary education, the National Assessment of Educational Progress.

Considerable preliminary work has been undertaken in the extensive workshops held by the National Center for Education Statistics on how best to proceed. But moving further has not been possible, as additional funds for implementation have not been available. Even the most modest improvement that such a monitoring system would make possible would provide returns many times over the resources required to create it.

Are there risks and shortcomings in developing and implementing such a monitoring system? Yes, there are, and care would have to be taken to minimize them. The process would have to achieve consensus in the higher education community on what and how to measure. The timing is good, though, for there has recently been considerable work on assessment technology, in terms of performance assessment and the use of portfolios, for example. While a monitoring system would be based on samples, and not provide information for individual students and institutions, it would greatly aid in the development of assessment instruments in higher education generally. The knowledge from work on technology and measurement approaches can be transferred, and information would be available for the nation as a whole that could be used for comparison.

But we should keep in mind that not all the outcomes of higher education can be so precisely quantified. It has been said that not everything that counts can be counted, and not everything that is counted, counts (attributed to Albert Einstein). A parallel approach should be pursued, in developing "indicators of good practice" that can be agreed upon and monitored. We report on the work that has proceeded thus far in developing such indicators, as well.

In short, how much learning takes place when students proceed toward their degrees, what degrees of learning are we achieving in our vast education system, and how is this changing over time?

SUMMARY AND HIGHLIGHTS

This report is about the limited information we do have about the performance of higher education graduates, and how we can develop better performance indicators. While it is generally acknowledged that the United States has the best system of higher education in the world, colleges and universities have come under increased pressure to show what they accomplish, as public budgets become tighter, as tuition becomes more expensive, as concerns about global economic competitiveness abroad grow, and as the education reform movement subjects all aspects of education to scrutiny. The governors, the President, and the U.S. Congress have adopted as a goal for the year 2000 that "The proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially."

There is limited information on some aspects of the results of higher education from syntheses of small scale research projects, from the Graduate Record Examinations (GRE), from the Graduate Management Admissions Test (GMAT), from the 1992 National Assessment of Adult Literacy, and from periodic surveys of the employment and educational status of bachelor's degree recipients one year after graduation. There are also efforts under way to try to design an indicator system that would track progress, particularly toward the national goal set for the year 2000. In this report we are dealing with general indicators of how well the system, and segments of it, are performing. Many individual states are creating assessments that provide data for specific colleges and universities, for purposes of accountability and program improvement. These are not the focus of this report, although these matters are obviously related.

• Cognitive and Other Outcomes

* In syntheses of individual research studies, the collegiate experience has been found to have a positive impact on verbal and quantitative skills, oral and written communication, critical thinking, use of reason and evidence to address poorly structured problems, and intellectual flexibility. This positive impact exists after controlling for a variety of student characteristics and normal maturation.

* Quantitative and Analytical scores rose between 1991 and 1993 on the General Test of the GRE, and Verbal scores were stable; at the same time the volume of examinees rose 47 percent.

* Mean scores rose from 1981 to 1993 in eight GRE Subject Tests; they fell in seven Subject Tests. Seven Subject Tests had increases in the number of examinees, and eight had declines.

* GMAT scores have improved over the last dozen years, with volumes of test takers rising until 1990, and then dropping sharply (as volume dropped, scores held steady).

• Literateness

In 1992, ETS, under contract with the National Center for Education Statistics, assessed a national sample of all adults,

age 16 and over. From this assessment we can determine how literate college graduates are, using prose, document, and quantitative materials.

* *Prose Literacy - U.S. born adults age 16 and over*

-Three percent of two-year college graduates and 2 percent of four-year college graduates performed only at Level 1, the lowest level. They can locate a single piece of information in a text, when there is little distracting information to deal with.

-Eighteen percent of two-year college graduates and 9 percent of four-year graduates are at Level 2. They can locate a single piece of information when there is distracting information, and they can integrate, compare, and contrast information.

-Forty-one percent of two-year college graduates and 35 percent of four-year graduates are at Level 3, where they can match information in a text to that in a directive given to them, when some inference is required.

-Thirty-four percent of two-year college graduates and 42 percent of four-year graduates are at Level 4, where they can integrate and synthesize information from complex or lengthy passages and make more complex inferences.

-Just 4 percent of two-year college graduates, and 11 percent of four-year graduates are at Level 5, where they can make high level inferences based on text and can find information in dense text with considerable distracting information that might seem plausible, but is incorrect.

* *Document Literacy - U.S. born adults age 16 and over*

-Five percent of two-year college graduates and 3 percent of four-year graduates are only at Level 1, the lowest level. They can match information and fill in personal information on forms.

-Twenty-two percent of two-year college graduates and 13 percent of four-year graduates are at Level 2. They can match information in documents that contain distractors, and they can integrate information from several places in a document.

-Forty-three percent of two-year college graduates and 37 percent of four-year college graduates are at Level 3. They can integrate several pieces of information and deal with rather complex tables and graphs that contain information not pertaining to the task.

-Twenty-six percent of two-year college graduates and 39 percent of four-year college graduates are at Level 4. They can perform tasks requiring greater inferences and involving more detailed information.

-Just 4 percent of two-year college graduates and 8 percent of four-year graduates reach Level 5. They can use complex documents that contain distracting information and make high-level inferences.

* *Quantitative Literacy - U.S. born adults age 16 and over*

-Four percent of two-year college graduates and 2 percent of four-year graduates are only at Level 1, the lowest level. They can perform single,

relatively simple operations (addition, subtraction, multiplication).

-Seventeen percent of two-year college graduates and 10 percent of four-year graduates are at Level 2. They can perform an arithmetic operation using numbers given to them or easily located in the material.

-Forty-four percent of two-year college graduates and 40 percent of four-year graduates are at Level 3. They can solve problems with two or more numbers located in printed material.

-Thirty percent of two-year college graduates and 40 percent of four-year graduates are at Level 4. They can handle two or more arithmetic operations in sequence.

-Just 5 percent of two-year college graduates and 13 percent of four-year graduates are at Level 5. They can perform multiple arithmetic operations sequentially.

* *Levels of Literacy in Relation to Education.* Prose proficiency rises with education. Three-fourths of adults with between zero and eight years of school are in the lowest Level, 1, as are 40 percent of high school dropouts. Over 75 percent of two-year college graduates and 85 percent of four-year graduates reach Level 3. However, just 4 and 10 percent, respectively, reach Level 5.

* *The Distribution of Literacy by Education.* Proficiency varies hugely at each level of educational achievement, and the distributions overlap considerably. For example, the top 25 percent of high school graduates scores higher than the bottom 25 percent of four-year college graduates.

* *Literacy in Relation to Weeks Worked.* College graduates work more weeks during the year than people with less education. Among college graduates, those with higher literacy levels work more weeks than the others.

* *Literacy in Relation to Weekly Wages.* Four-year college graduates have higher weekly wages than two-year graduates, who have higher wages than high school graduates. Within all three groups, weekly wages are higher at higher literacy levels.

* *Literacy in Relation to Age.* While there is little difference in the literacy proficiencies of graduates ages 16 to 24 and those 25 to 54, graduates who are 55 and over have substantially lower literacy levels. Whether with two- or four-year degrees, older college graduates have lower literacy levels than younger ones, and average age is generally lower at each higher increment in literacy level.

* *Literacy in Relation to the Generations.* Parents' education influences the literacy proficiency levels reached by their children. Even among children with similar levels of education, those with better educated parents have higher prose literacy proficiencies. The highest preforming group were those with four-year college degrees who had parents with four-year college degrees.

• **After Graduation**

* A year after graduation, about three-fourths of employed graduates with a bachelor's degree are in jobs related to their fields of study, unchanged since

1985. However, 44 percent are in jobs not requiring a four-year degree, up from 1985.

* Recent degree holders in business management and engineering are most likely to be employed full-time one year after graduation; biology degree holders are least likely.

* Graduates with health, engineering, and education degrees are most likely to be employed in jobs related to their fields of study. Those in humanities and social science, public affairs and social services are the most likely to be working in jobs that do not require a four-year degree.

* The percent of recent graduates who are unemployed a year after graduation has varied with the business cycle. More have been continuing their schooling since the mid 1980s.

* Recipients of bachelor's degrees in biology are most likely to continue their education and to enroll in graduate degree programs; business and management degree holders are the least likely.

* Annual salaries (in constant dollars) of bachelor's degree recipients, one year after graduation, have been fairly flat since 1976. Average female salaries are 87 percent of average male salaries, ranging from 83 percent in social sciences to 105 percent in history.

* Bachelor's degree graduates with health profession degrees had the highest salaries one year after graduation; those with degrees in physical sciences, mathematics, and computer science had the largest percentage salary increase over 15 years.

* Health and education majors are the most likely to be employed in their field of study one year after graduation.

• Toward Higher Education Indicators

* A national goal for the year 2000 is to "increase substantially the proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems." How is progress to be monitored?

* A group appointed by the National Education Goals Panel recommended that a new assessment system be created for higher education modeled upon the existing one for elementary and secondary education, the National Assessment of Educational Progress. It would be an assessment of a representative sample of colleges and universities to produce a national indicator. It also recommended identifying a set of "good practice" indicators, practices that research shows are tied to improved student performance.

* The National Center for Education Statistics issued an RFP to take the initial steps to create an assessment system. But it was withdrawn due to lack of funds.

* Subsequently, Peter Ewell and his associates at the National Center for Higher Education Management Systems, under contract with the National Center for Education Statistics, identified indicators of "good practice," where

data could be collected through existing and new surveys. Also, the Community College Roundtable has identified indicators of effectiveness of community colleges.

* With some preliminary work now in place, the question is whether the resolve exists to move forward to secure better information to help in guiding improvement in the higher education system. Any such efforts would have to strive to reach consensus in the higher education community, and recognize that the diverse purposes of higher education cannot all be captured in test scores and statistics.

* An important element of any indicator system must be the academic performance of college graduates in some set of content and skill disciplines. There seems to be general consensus around skills, such as those included in the National Education Goals for the year 2000, the skills of communications, critical thinking, and problem solving. The diversity of college and university disciplines makes the challenge of measuring content knowledge more complex.

INTRODUCTION

America's higher education system is the envy of the world. It is noted for its accessibility, for its dazzling variety, and for the high quality of many of its programs.

In most countries, the higher education community prides itself on tradition and on its role as a conservatory of the nation's culture and wisdom. American universities and community colleges have been unusually flexible and adaptive in meeting the rapidly changing needs of our agricultural, industrial, and technological societies. They have adapted while still keeping alive some aspects of the European higher education tradition.

This large and vigorous education system has been vital to national economic growth. It has provided our democratic institutions with educated, articulate, and informed leaders and constituencies that can understand and respond to complex issues. As Malcolm Muggridge put it, "Higher Education is booming in the United States; the Gross National Mind is mounting along with the Gross National Product." Or, it could likely be put the other way around.

The system is, in fact, too important to all of us, and to each individual who goes through it, not to be scrutinized. And while American higher education retains considerable respect at a time when it has declined for many other institutions in society, it is also feeling pressure from converging sources to prove its performance. Among them:

- A heightened concern for our international economic competitive position
- Galloping tuition costs, greatly exceeding the general rate of inflation
- Pinched public budgets, actual cutbacks in funding for many public institutions, and demands from many state legislatures that the higher education product be measured
- A general clamor for education reform, now at least a decade old
- A demand from accrediting agencies that colleges and universities show evidence that students are meeting educational goals

How these forces affect the views of individual citizens is hard to determine. Parents worry about their children going to college, and what they get for their money. They hear of the drinking reputations of a lot of student bodies. They read of grade inflation, even at schools like Stanford. They wonder what polarizing debates about such things as political correctness mean for the bottom line of learning. In any case, it is these individuals who made a book by Allan Bloom, *The Closing of the American Mind: How Higher Education Failed Democracy and Impoverished the Soul of Today's Students*, into a bestseller.

And in a recent report by the "Wingspread Group on Higher Education," chaired by William E. Brock, the group charged that a "dangerous mismatch exists between what American society needs of higher education and what it is receiving. No where is the mismatch more dangerous than in the quality of undergraduate preparation provided on many campuses."

These conditions and concerns have been expressed, among other ways, in the accountability legislation at the state level. Recently, Missouri and South Dakota started senior level testing programs. Arkansas joined Florida and Texas in having "rising-junior" exams. California has imposed outcomes testing on community colleges, and Colorado institutions are expected to do "value added" testing from the freshman to the senior years. Legislation is pending in Texas.

And in 1989, at the Education Summit in Charlottesville, Virginia, President Bush and the nation's governors set national goals for the entire education system, including higher education, that by the year 2000, "The proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively and solve problems will increase substantially." This led to exploring approaches to monitoring whether this goal is being achieved. A report on these efforts, and what came out of them so far, is provided in the section of this report entitled "Toward Higher Education Indicators?"

* * * *

This report is about the limited quantitative information now available about the results of higher education, and about how we might get better information. It's focus is on indicators for the nation, or for a state, or for a segment of higher education. It is not about an accountability system to track the performance of a particular institution. At the same time, indicator systems can play a constructive role in informing policy and in serving as a model and laboratory for the development of an assessment technology that can be applied as well at the level of individual institutions. *All this presumes that a process would be used to develop an indicator system that would achieve broad consensus in the higher education community and among policymakers responsible for the system.*

This broad consensus, assuming it can be achieved, would provide some assurance of relevance to higher education's aims and mission. But that consensus needs to recognize both the limitations of quantitative measurement as well as its uses. For no quantitative measurement will reflect the accomplishment of all that we expect from higher education. Many purposes have been articulated for higher education, and individual institutions would give different emphasis and weights to these purposes. How, for example, would we determine if we were achieving the purpose described by the late Stephen K. Bailey, eminent educator and political scientist, who said: "I get an education so that later in life (rapping his knuckles on his forehead), when I knock on me, somebody answers." No, we don't think that the destiny of higher education should be turned over to bean counters. But good information, carefully developed, and wisely used by minds that can answer when somebody knocks, can be constructive.

Having established some context for the reader to understand the authors' perspective, we describe the contents to follow. We have accumulated the data that are now available about higher education outcomes. These data provide a useful, but limited, perspective on the performance of graduates of higher education. In thinking about what we need, it helps to know what we now have.

- There have been a large number of small-scale research studies, synthesized in a monumental work by Ernest Pascarella and Patrick Terenzini.

- The Graduate Record Examination, general and subject matter tests, is taken by the majority of college graduates who go on to graduate education. We also include the results of the Graduate Management Admissions Test, taken by tens of thousands of college graduates who go on to business schools.

- There has been a large-scale literacy study that sheds light on the literateness of college graduates. The recently administered National Adult Literacy Survey (1992) gives us a representative set of data in that it was administered to a random stratified sample of over 25,000 adults aged 16 and older in households and prisons all across the country. Since the samples included significant numbers of graduates of two- and four-year institutions, we can examine in some interesting detail how these subgroups compare to other groups in the population in terms of knowledge, skills, job success, earning power, and unemployment histories. Many of the assessment tasks attempt to measure problem-solving and communication skills. We can also see how college graduates with varying literacy levels do in these areas. This constitutes the largest section of the report.

- The labor market outcomes for four-year college graduates, one year after they received their bachelor's degree. These data go back to 1976.

As noted earlier, these data give a limited picture of the results of the higher education enterprise. Graduate Record Examinations are taken only by those planning to continue their educations. Raising literacy levels may not be considered an explicit goal of colleges and universities, and while we tout college as the way to get ahead in the economy, economic success is not the only purpose of higher education. We make no pronouncements about the overall health of the higher education system based on these statistics, although we should take from them what they do have to offer.

Finally, we report on recent efforts to create a more comprehensive system, in the section entitled "Toward Higher Education Indicators," and we close with some observations about the data provided and prospects for the future.

COGNITIVE AND OTHER OUTCOMES

There are, of course, no comprehensive outcome measures for college education in the U.S., no national examination at graduation, and no sample-based assessment that would permit monitoring what happens to students in two or four years at college. There have, however, been many research studies with specific college populations, and there do exist tests taken by a large proportion of four-year college graduates who apply for graduate school. In this brief section, we summarize what is known from these sources:

1. Over 2,600 research studies on the effect of college on students have been synthesized in a 900-page book by Ernest Pascarella and Patrick Terenzini. The results are presented in summarized form.

2. The results of the Graduate Record Examination (GRE) tests of verbal, quantitative, and analytical skills for the years 1981-1993 are displayed.

3. The results of the GRE subject matter tests are provided, showing change since 1981.

4. The results of the Graduate Management Admissions Test (GMAT) from 1982 to 1993.

Synthesis of Research on College Outcomes

In the 900-page book, *How College Affects Students*, Ernest Pascarella and Patrick Terenzini take on the monumental task of synthesizing over 2,600 research studies on the effects of college. On the page to the right, we summarize the results in areas of cognitive development, in terms of the net effect, discounting for "normal maturation, mere aging, or other noncollegiate sources of change." These studies also control for a variety of student characteristics that vary from study to study.

There are positive impacts in all areas of cognitive development studied.

Pascarella and Terenzini also address other areas of development. They find moderate or strong evidence for a positive effect on:

- Aesthetic, cultural, and intellectual values
- Value placed on a liberal education
- Value placed on intrinsic occupational rewards
- Political liberalism
- Gender roles ("toward the `modern'")
- Academic self-concept
- Social self-concept
- Self-esteem
- Intellectual orientation
- Personal adjustment and psychological well-being
- Use of principled reasoning in judging moral issues

Source: Ernest T. Pascarella and Patrick T. Terenzini, *How College Effects Students*, Jossey-Bass, 1991.

College has been found to have a positive impact on verbal and quantitative skills, oral and written communication, critical thinking, use or reason and evidence to address ill-structured problems, and intellectual flexibility, after controlling for a variety of other characteristics, and such factors as normal maturation.

Synthesis of Research Studies on the Net[1]
Effects of College on Learning and Cognitive Development

- *General Verbal Skills*

Strong evidence of a positive effect, after controlling for precollege verbal skills, race, and socioeconomic status. Graduates have a 10 to 13 percentile point advantage, over those not going to college.

- *General Quantitative Skills*

Strong evidence of a positive effect, after controlling for precollege quantitative skills, race, and socioeconomic status. Graduates have a 11 to 13 percentile point advantage.

- *Oral Communication Skills*

Moderate evidence of a positive effect, after controlling for age and academic ability. The magnitude of the net effect is unclear.[2]

- *Written Communication Skills*

Moderate evidence of a positive effect, after holding age and academic ability constant. The magnitude of the net effect is unclear.[2]

- *General Intellectual and Analytical Skill Development*

Moderate to strong evidence of a positive effect, after controlling for age, verbal ability, and quantitative ability. Magnitude of the effect is unclear.[2]

- *Critical Thinking*

Strong evidence of a positive effect, after controlling for precollege critical thinking, academic aptitude, socioeconomic status, and educational aspirations. Freshman year net effect was 17 percentile points. Magnitude of the net effect for all four years is unclear.[2]

- *Use of reason and evidence to address ill-structured problems* (reflective judgment, informal reasoning)

Moderate to strong evidence of a positive impact, after controlling for age, intelligence, and academic aptitude. Magnitude unclear.[2]

- *Intellectual flexibility*

Moderate to strong evidence of a positive impact, after controlling for age, intelligence, and academic impact. Magnitude unclear.[2]

[1]The college's net or unique impact, "as distinct from normal maturation, mere aging, or other noncollegiate sources of change."
[2]"Unclear," as used by the authors here, means that they acknowledge that the studies do not allow such estimates or that the evidence, though generally consistent, is still sufficiently complex to make an estimate of effect size hazardous.

Graduate Record Examinations General Test

Quantitative and Analytical scores on the General Test of the Graduate Record Examinations (GRE) rose from 1981 to 1993, while verbal scores remained about the same. On a scale of 200 to 800, mean scores on the Quantitative measure rose 27 points from 1981 to 1993. Scores on the Analytical measure rose 35 points. On the Verbal measure, there was only a small decline of 3 points (see Figure 1). Scores declined slightly in the early 1990s, as the volume of test takers shot up substantially.

Thus scores rose or remained fairly constant at a time when the number of test takers rose sharply. In 1993, 199,550 took the examination, an increase of 47 percent over 1981.

By this measure, the scholastic abilities of applicants to graduate school have been increasing substantially in quantitative and analytical ability, with little change in verbal ability. Typically scores on such tests *decline* as volume rises; it is fair to conclude that there were solid gains in the skills these tests measure.

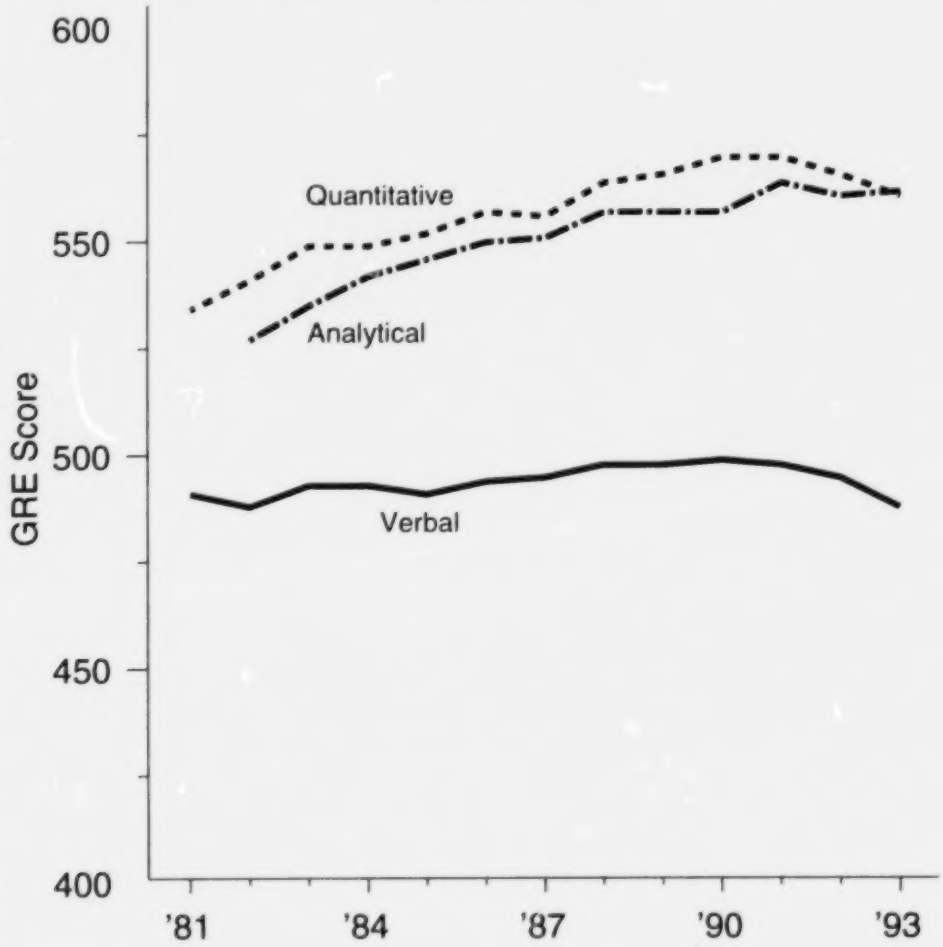
The General Test of the Graduate Record Examinations yields separate scores for the verbal, quantitative, and analytical abilities related to success at the graduate level of education.

- The verbal measure employs four types of questions: antonyms, analogies, sentence completions, and reading comprehension.
- The quantitative measure employs three types of questions: discrete quantitative questions, data interpretation questions, and quantitative comparison questions.
- The analytical measure is of analytical reasoning and logical reasoning.

Most examinees apply to graduate school, but not all enroll. Not all graduate departments in the United States require the GRE General Test. Even though the number of departments that use the test is large and appears to be increasing, GRE General Test examinees are not necessarily representative of all applicants to or enrollees in a field or in graduate education generally.

Quantitative and Analytical scores rose between 1981 and 1993 on the General Test of the Graduate Record Examination, and Verbal scores were stable. At the same time, the volume of examinees increased 47 percent.

Figure 1: GRE Score Trends, 1981 - 1993



	1981	1993	
Volume	*135,339*	*199,550*	*Up 47 Percent*
Verbal Mean	*491*	*488*	*Down 3 Points*
Quantitative Mean	*534*	*561*	*Up 27 Points*
Analytical Mean	*527*	*562*	*Up 35 Points*

Note: Data are for college seniors and non-enrolled college graduates.

Graduate Record Examinations Subject Tests

Large increases on GRE Subject Test volumes between 1981 and 1993 occurred in computer science, literature, physics, mathematics, sociology, history, and psychology. Score increases occurred in computer science, math, sociology, and psychology; decreases occurred in the other subjects (see Figure 2).

Decreases in the volume of test-takers occurred in geology, music, education, economics, biology, political science, chemistry, and engineering.

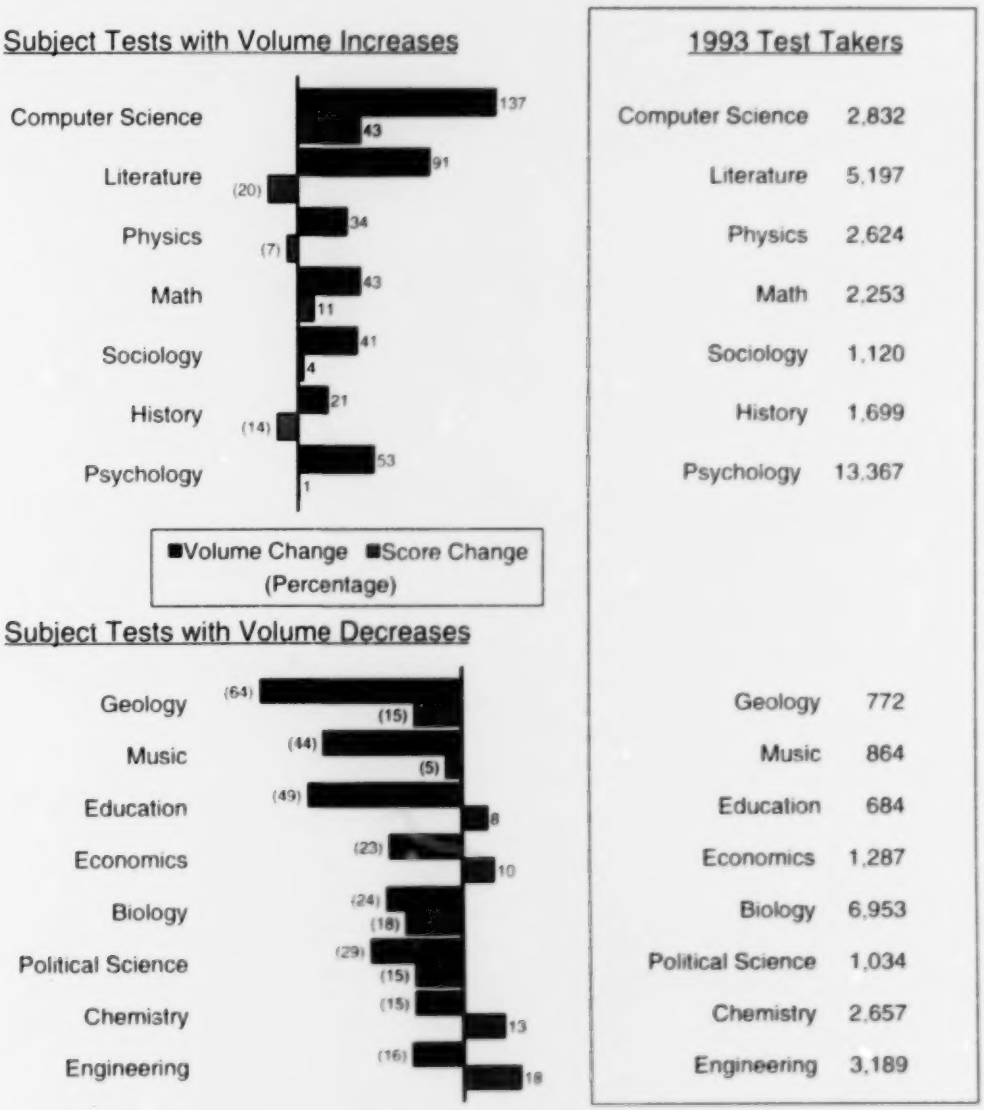
Figure 2 also shows GRE Subject Test volumes for the 1992-93 testing year.

Scores on the GRE Subject Tests are intended to indicate students' knowledge of the subject matter emphasized in many undergraduate programs as preparation for graduate study. For some Subject Tests, subscores are provided in addition to the total score; these subscores indicate the strengths and weaknesses of individual students' preparation.

Total testing time for each Subject Test is 2 hours and 50 minutes.

Mean scores rose from 1981 to 1993 in eight GRE Subject Tests; they fell in seven subject tests.
Seven subject tests had increases in examinees, and eight had declines.

Figure 2: Changes in the Number of Examinees and Mean Scores, GRE Subject Tests, 1981 - 1993



Note: Data are for college seniors and non-enrolled college graduates

Graduate Management Admission Test (GMAT)

Average GMAT scores have been on the upswing over the last decade, increasing from 481 in 1982 to 500 in 1993 for U.S. test takers. During the same decade, the number of U.S. test takers reached an all-time high of more than 160,000 in 1990; rebounding from a low of about 114,000 in 1984 (see Figures 3 and 4), but dropped back sharply to 135,000 by 1993.

These test takers represent the vast majority of applicants to MBA or Ph.D. programs in business and management fields.

The GMAT is a test of developed abilities that is sponsored and directed by the Graduate Management Association Council and administered by Educational Testing Service. GMAT results provide counselors with one predictor of academic performance in graduate management school. Scores on the GMAT are currently used by about 1,000 graduate management programs throughout the world and are required of every applicant by about 780 institutions. Thus, this pool of test takers represents the vast majority of applicants to MBA or Ph.D. programs in business and management fields.

Graduate Management Admission Test (GMAT) scores have increased steadily throughout the decade.

Figure 3: Trends in Average GMAT Scores

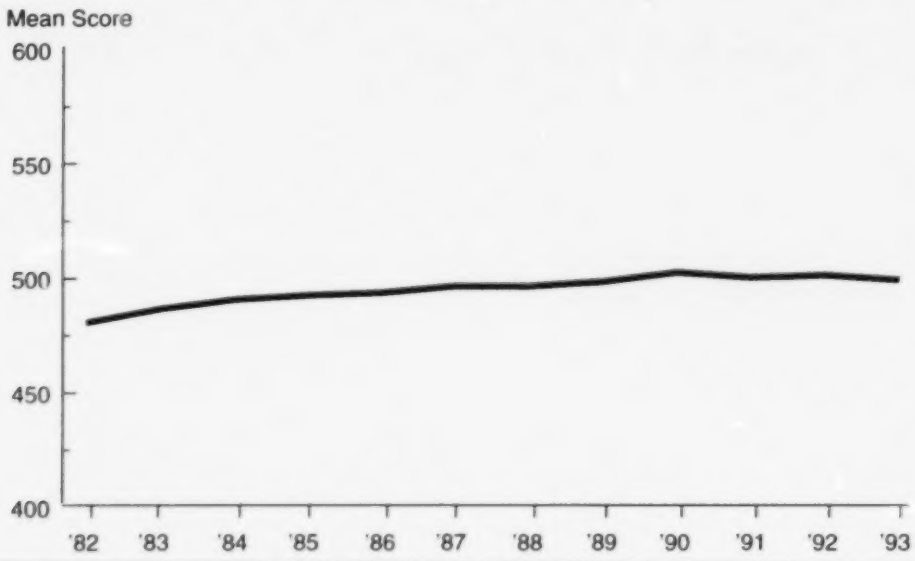
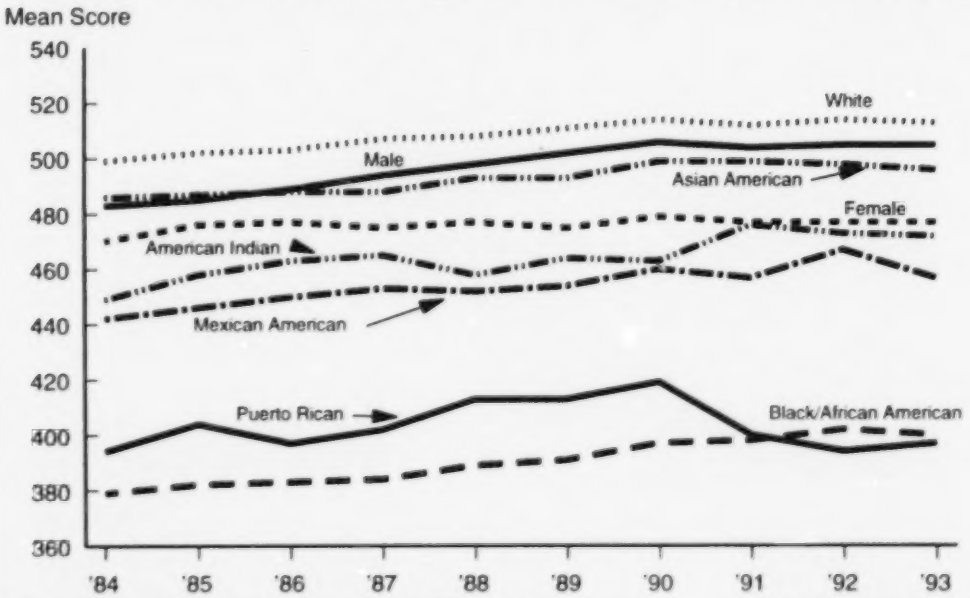


Figure 4: Trends in Average GMAT Scores by Race/Ethnicity



The descriptor, "non-Hispanic," was attached to the "White" sub-group category and the additional sub-group "Other Hispanic/Latin American," was added as an option in 1992-1993. The 1993 mean score for "Other Hispanic/Latin American" was 461.

Note: Mean scores for males and females are for the world population; all other scores are for U.S. citizens only.

LITERATENESS

We ask in this section, how literate are college graduates? To answer this question we draw upon the results of the first comprehensive study of literacy in the United States, a national study carried out in nearly 27,000 homes, and representative of all adults age 16 and over living in households or federal and state prisons. It was mandated by Congress and carried out in 1992 by Educational Testing Service under contract with the National Center for Education Statistics.

We use the term "literateness" in the title to make a point. The survey is of "literacy." However, in recent usage, the term literacy has come to be thought of simply as the opposite of "illiteracy," which is understood as being unable to read or write at all, being unable to decode the printed word, or comprehend it. So we tend to think of a literacy study as one that finds out how many so-called illiterates there are. We also remember the "literacy test" imposed for voting qualification in some states. Coming at it with this mindset would raise the natural question, why would such a study have relevance to those who complete a higher education?

Actually, the term "literate" has a very broad definition. Its first definition, in Webster's Collegiate Dictionary, is "educated, cultured," its second is "able to read and write," and its third is "versed in literature or creative writing." The term "illiteracy" includes "a mistake or crudity." The National Adult Literacy Study is not a survey of "illiteracy." The definition of literacy used in this large scale assessment is as follows:

> Using printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential.

The 1992 literacy study was not designed to set "cut-points" to count the number of illiterates, a term not used in the report, *Adult Literacy in America*, written by Irwin Kirsch and his colleagues. Rather, it profiles the literateness of the entire population, whatever the occupational and educational achievements. The tasks are centered on real life encounters with the printed word, are performance-oriented, and have a range of difficulty that reaches to, and beyond, those educated at the graduate level.

Given this definition, and the 165 tasks used to operationalize it, we can answer the question — how literate are Americans who have college educations, specifically those with two-year and four-year degrees. While in a general way we expect those who are better educated to be more literate by such a definition, it must be asked: In what way, if any, can we... should we... judge the quality of such education by how well graduates do on these 165 tasks? We know of no college curriculum that directly addresses negotiating these common tasks encountered in living. Moreover, we know that higher education serves a variety of purposes, that institutions follow different paths to them, and that there is great debate and disagreement over these purposes. Indeed, we ask elsewhere in this report whether — and with what advantages, what limitations, and what dangers — any standardized assessment instrument can

measure the degree of achievement in higher education. In the final analysis, it is a question only the interested and thoughtful reader of this report can answer. What we will do in the following pages is present the results of the assessment, in a way that should enable the reader to form judgements about its utility and what it conveys about the literateness of higher education graduates.

But to do this the reader needs to know a little about the assessment (a more extended, but still short, discussion can be found in the ETS Policy Information Center publication, *Becoming Literate About Literacy*).

The definition of literacy used in this assessment, and described above, encompasses the multifaceted nature of literacy — it is not a single skill, i.e. reading, but rather literacy involves an ordered set of skills that are necessary to accomplish various tasks in various contexts. Balancing a checkbook, obtaining information from a train schedule, and understanding a passage from a novel — each of these tasks calls for literacy skills, but not the same skills. The National Adult Literacy Survey employed three proficiency scales to measure these distinct skills: prose, document, and quantitative. Their definitions are below.

Prose Literacy - the knowledge and skills needed to understand and use information from texts that include editorials, news stories, poems, and fiction; for example, finding a piece of information in a newspaper article, interpreting instructions from a warranty, inferring a theme from a poem, or contrasting views expressed in an editorial.

Document Literacy - the knowledge and skills required to locate and use information contained in materials that include job applications, payroll forms, transportation schedules, maps, tables, and graphs; for example, locating a particular intersection on a street map, using a schedule to choose the appropriate bus, or entering information on an application form.

Quantitative Literacy - the knowledge and skills required to apply arithmetic operations, either alone or sequentially, using numbers embedded in printed materials; for example, balancing a checkbook, figuring out a tip, completing an order form, or determining the amount of interest from a loan advertisement.

More than 400 trained interviewers conducted the survey, administering the literacy assessment to over 26,000 individuals during the first eight months of 1992. A separate assessment was carried out for the prison population. The assessment consisted of a set of tasks that simulated real life situations encountered at home, at work, and in the community. Almost all of the tasks required participants to construct their responses, as opposed to choosing a response from multiple choices.

Twelve states also asked ETS to collect samples of their populations so they can now compare their state results to one another and to the national statistics.

The background questionnaire, which took about 20 minutes to administer, asked about:

- general language background
- educational background and experience
- political and social participation
- labor force experience
- literacy activities
- demographic information

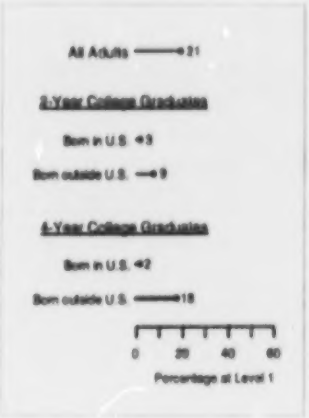
The literacy assessment consisted almost entirely of simulation tasks. These emphasized a broad range of literacy skills used in home, work, and in social contexts. Many of the tasks required brief oral and written responses and asked *how* problems were set up and resolved. Some involved the use of a simple, four-function calculator.

One way of presenting the survey results would be to describe how all adults did on each of the 166 tasks. To do so would place a very large burden on the reader, making it difficult to conclude what the state of literacy is for each population group. To help make such judgments, statistical methods were used to construct proficiency scales from the answers to the tasks, scales similar to the ones used to report the results of the SAT. The National Adult Literacy Survey scales range from 0 to 500. Individual tasks are assigned scores along the scales, to give examples of what people with a particular score are likely to be able to do. The scales were then divided into five levels, each encompassing a defined score range, such as from 226 to 275. Individuals scoring within these scale levels would have a high probability of performing the tasks at the level successfully (a high probability is defined as at least 80 percent of the time).*

In the pages that follow, we show what each level of literacy means for each of the three literacy scales. For each level, we show the percent of the adult population at that level, and the percent of two- and four-year college graduates at that level, separately for those born in the U.S. and its territories, and those born elsewhere. We also show the relationship of literacy to weeks worked, average wages, age, and education of parents, for both two- and four-year college graduates.

*And they would have a small chance of performing tasks at a higher level.

Three percent of U.S. born two-year college graduates and 2 percent of four-year college graduates perform at the lowest Prose Level (Level 1). They can locate a single piece of information in a text, when there is little distracting information to deal with.



They can:

read relatively short text to locate a single piece of information that is identical to or synonymous with, the information given in the question or directive. Distracting information is minimal.*

They are likely to succeed at tasks such as:

- **Identify the country in a short article *(149)***
- **Locate one piece of information in a sports article *(210)* (See below)**
- **Underline a sentence explaining the action stated in a short article *(225)***

*However, some were at the lower end of this level where they could not perform even these routine tasks.

EXAMPLE TASK

Underline the sentence that tells what Ms. Chanin ate during the swim

Swimmer completes Manhattan marathon

The Associated Press

NEW YORK—University of Maryland senior Stacy Chanin on Wednesday became the first person to swim three 28-mile laps around Manhattan.

Chanin, 23, of Virginia, climbed out of the East River at 96th Street at 9:30 p.m. She began the swim at noon on Tuesday.

A spokesman for the swimmer, Roy Brunett, said Chanin had kept up her strength with "banana and honey" sandwiches, hot chocolate, lots of water and granola bars."

Chanin has twice circled Manhattan before and trained for the new feat by swimming about 28.4 miles a week. The Yonkers native has competed as a swimmer since she was 15 and hoped to persuade Olympic authorities to add a long-distance swimming event.

The Leukemia Society of America solicited pledges for each mile she swam.

In July 1983, Julie Ridge became the first person to swim around Manhattan twice. With her three laps, Chanin came up just short of Diana Nyad's distance record, set on a Florida-to-Cuba swim.

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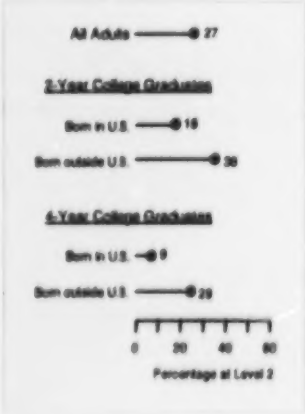
Just under one in five U.S. born two-year college graduates, and one in 11 four-year graduates function at Prose Level 2. They can locate a single piece of information when there is distracting information, and they can integrate, compare, and contrast information.



They can:
locate a single piece of information when there is distracting information or other information that seems plausible as the answer but is incorrect. They can also integrate, compare, or contrast two or more pieces of information.

They are likely to succeed at tasks such as:
- Underline meaning of a term given in government brochure on supplemental security income *(226)*
- Locate two features of information in a sports article *(250)*
- Interpret instructions from an appliance warranty *(275)* (See below)

EXAMPLE TASK

A manufacturing company provides its customers with the following instructions for returning appliances for service:

> When returning appliance for servicing, include a note telling as clearly and as specifically as possible what is wrong with the appliance.

A repair person for the company receives four appliances with the following notes attached. Circle the letter next to the note which best follows the instructions supplied by the company.

A. The clock does not run correctly on this clock radio. I tried fixing it, but I couldn't.

B. My clock radio is not working. It stopped working right after I used it for five days.

C. The alarm on my clock radio doesn't go off at the time I set. It rings 15-30 minutes later.

D. This radio is broken. Please repair and return by United Parcel Service to the address on my slip.

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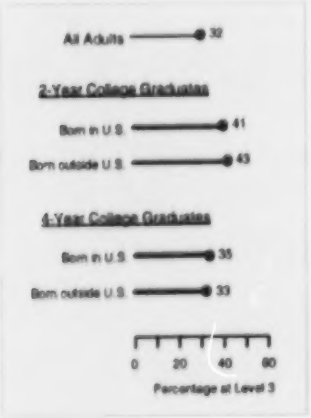
Two in five U.S. born two-year college graduates, and over one in three four-year graduates can match information in a text to that in the directive given to them, when some inference is required.



They can:

match information in the text and in the task when low level inferences are required, integrate information from dense or lengthy text, and generate a response based on information easily identified in the text.

They are likely to succeed at tasks such as:

- Write a brief letter explaining error made on a credit card bill *(288)*
- Read a news article and identify a sentence that provides interpretation of a situation *(304)*
- Read a lengthy article to identify behaviors that meet a stated condition *(316)*

EXAMPLE TASK

List two things that Chen became involved in or has done to help resolve conflicts due to discrimination.

IDA CHEN is the first Asian-American woman to become a judge of the Commonwealth of Pennsylvania.

She understands discrimination because she has experienced it herself.

Soft-spoken and eminently dignified, Judge Ida Chen prefers hearing about a new acquaintance rather than talking about herself. She wants to know about career plans, hopes, dreams, fears. She gives unsolicited advice as well as encouragement. She instills confidence.

Her father once hoped that she would become a professor. And she would have also made an outstanding social worker or guidance counselor. The truth is that Chen wears the caps of all these professions as a Family Court judge of the Court of Common Pleas of Philadelphia County, as a participant in public advocacy for minorities, and as a particularly sensitive, caring person.

She understands discrimination because she has experienced it herself. As an elementary school student, Chen tried to join the local Brownie troop. "You can't be a member," she was told. "Only American girls are in the Brownies."

Originally intent upon a career as a journalist, she selected Temple University because of its outstanding journalism department and affordable tuition. Independence being a personal need, she paid for her tuition by working for Temple's Department of Criminal Justice. There she had her first encounter with the legal world and it turned her career plans in a new direction — law school.

Through meticulous planning, Chen was able to earn her undergraduate degree in two and a half years and she continued to work three jobs. But when she began her first semester as a Temple law student in the fall of 1973, she was barely able to stay awake. Her teacher Lynne Abraham, now a Common Pleas Court judge herself, couldn't help but notice Chen yawning in the back of the class, and when she determined that this student was not a party animal but a workhorse, she arranged a teaching assistant's job for Chen on campus.

After graduating from Temple Law School in 1976, Chen worked for the U.S. Equal Employment Opportunity Commission where she was a litigator on behalf of plaintiffs who experienced discrimination in the workplace, and then moved on to become the first Asian-American to serve on the Philadelphia Commission on Human Relations.

Appointed by Mayor Wilson Goode, Chen worked with community leaders to resolve racial and ethnic tensions and also made time to contribute free legal counsel to a variety of activist groups.

The "Help Wanted" section of the newspaper contained an entry that aroused Chen's curiosity — an ad for a judge's position. Her application resulted in her selection by a state judicial committee to fill a seat in the state court. And in July of 1988, she officially became a judge of the Court of Common Pleas. Running as both a Republican and Democratic candidate, her position was secured when she won her seat on the bench at last November's election.

At Family Court, Chen presides over criminal and civil cases which include adult sex crimes, domestic violence, juvenile delinquency, custody, divorce and support. Not a pretty picture.

Chen recalls her first day as judge, hearing a juvenile dependency case — "It was a horrifying experience. I broke down because the cases were so depressing," she remembers.

Outside of the courtroom, Chen has made a name for herself in resolving interracial conflicts, while glorying in her Chinese-American identity. In a 1986 incident involving the desecration of Korean street signs in a Philadelphia neighborhood, Chen called for a meeting with the leaders of that community to help resolve the conflict.

Chen's interest in community advocacy is not limited to Asian communities. She has been involved in Hispanic, Jewish and Black issues, and because of her participation in the Ethnic Affairs Committee of the Anti-Defamation League of B'nai B'rith, Chen was one of 10 women nationwide selected to take part in a mission to Israel.

With her recently won mandate to judicate in the affairs of Pennsylvania's citizens, Chen has pledged to work tirelessly to defend the rights of its people and contribute to the improvement of human welfare. She would have made a fabulous Brownie.

— Jessica Schultz

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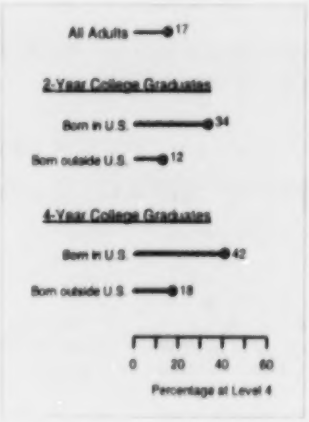
One in three U.S. born two-year college graduates, and over two in five four-year graduates can integrate and synthesize information from complex or lengthy passages and make more complex inferences.



They can:

match text with multiple features, integrate or synthesize information from complex or lengthy passages, and make more complex inferences.

They are likely to succeed at tasks such as:

- State in writing an argument made in a lengthy newspaper article *(328)*
- Contrast views expressed in two editorials on technologies available to make fuel-efficient cars *(359)* (See below)
- Compare two metaphors used in a poem *(374)*

EXAMPLE TASK

Contrast Dewey's and Hanna's views about the existence of technologies that can be used to produce more fuel-efficient cars while maintaining the size of the cars.

Face-Off: Getting More Miles Per Gallon

Demand cars with better gas mileage

By Robert Dewey
Guest columnist

WASHINGTON — Warning: Automakers are resurrecting their heavy-metal dinosaurs, aka gas guzzlers.

Government reports show that average new-car mileage has declined to 28.2 miles per gallon — the 1986 level. To reverse this trend, Congress must significantly increase existing gas-mileage standards.

More than half our Nobel laureates and 700 members of the National Academy of Sciences recently called global warming "the most serious environmental threat of the 21st century." In 1989, oil imports climbed to a near-record 46% of U.S. consumption. Increasing gas mileage is the single biggest step we can take to reduce oil imports and curb global warming. Greater efficiency also lowers our trade deficit (oil imports represent 40% of it) and decreases the need to drill in pristine areas.

Bigger engines and bigger cars mean bigger profits for automakers, who offer us the products they want us to buy. More than ever, Americans want products that have less of an environmental impact. But with only a few fuel-efficient cars to choose from, how do we find ones that meet all our needs?

Government studies show automakers have the technology to dramatically improve gas mileage — while maintaining the 1987 levels of comfort, performance and size mix of vehicles. Automakers also have the ability to make their products safer. The cost of those improvements will be offset by savings at the gas pump!

Cars can average 45 mpg and light trucks 35 mpg primarily by utilizing engine and transmission technologies already on a few cars today. Further improvements are possible by using technologies like the two-stroke engine and better aerodynamics that have been developed but not used.

When the current vehicle efficiency standards were proposed in 1974, Ford wrongly predicted that they "would require either all sub-Pinto-sized vehicles or some mix of vehicles ranging from a sub-subcompact to perhaps a Maverick." At that time, Congress required a 100% efficiency increase, raising gas mileage to 45 mpg requires only a 60% increase.

Americans want comfortable, safe and efficient cars. If automakers won't provide them, Congress must mandate them when it considers the issue this summer.

Let's hope lawmakers put the best interest of the environment and the nation ahead of the automakers' lobbyists and political action committees.

Robert Dewey is a conservation analyst for the Environmental Action Foundation.

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Don't demand end to cars people want

By Thomas H. Hanna
Guest columnist

DETROIT — Do Americans look forward to the day when they'll have to haul groceries, shuttle the kids to and from school or take family vacations in compact and subcompact cars?

I doubt it — which is why U.S. and import carmakers oppose the 40-miles-per-gallon to 45 mpg corporate average fuel economy mandates that some are pushing in Congress, either to curb tailpipe carbon dioxide emissions because of alleged global warming or for energy conservation.

Since the mid-1970s, automakers have doubled the fleet average fuel economy of new cars to 28 mpg — and further progress will be made.

Compact and subcompact cars with mileage of 40 mpg or better are now available, yet they appeal to only 5% of U.S. car buyers.

But to achieve a U.S. fleet average of 40 mpg to 45 mpg, carmakers would have to sharply limit the availability of family-size models and dramatically trim the size and weight of most cars.

There simply are not magic technologies to meet such a standard.

Almost every car now sold in the USA would have to be drastically downsized, and many would be obsolete.

As a result, Americans each year would be unable to buy the vehicles most suited for their needs: mid- and family-size models, luxury automobiles, mini-vans, small trucks and utility vehicles.

The fleet shift to imports and subcompacts could also force the closing of assembly plants, supplier firms and dealerships, at a cost of thousands of U.S. jobs.

Although a growing number of scientists are skeptical of global warming, the issue deserves thorough international scientific evaluation, not premature unilateral U.S. action.

Carbon dioxide emissions from U.S. vehicles total less than 2.5% of worldwide "greenhouse" gases. Even doubling today's corporate average fuel economy for U.S. cars — if technically possible — would cut those gases about 5%.

Whatever the motivation — alleged global warming or energy conservation — the stakes are high for millions of Americans and thousands of U.S. jobs in unrealistic corporate average fuel economy mandates.

Thomas H. Hanna is president and chief executive officer of the Motor Vehicle Manufacturers Association of the United States.

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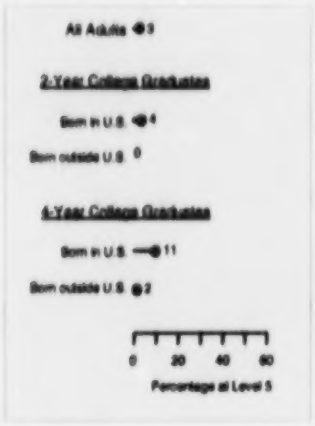
Just one in 25 U.S. born two-year college graduates and one in nine four-year graduates can make high level inferences based on text and can find information in dense text with considerable distracting information that might seem plausible but is incorrect.



They can:
find information in a dense text that contains considerable information that is distracting — information that may seem plausible as an answer but is incorrect. Also, they can make high-level inferences or use specialized background knowledge.

They are likely to succeed at tasks such as:

- Compare the approaches stated in a narrative on growing up *(382)*
- Summarize two ways lawyers may challenge prospective jurors *(410)*
- Interpret a brief phrase from a lengthy news article *(423)*

EXAMPLE TASK

Identify and summarize the two kinds of challenges that attorneys use while selecting members of a jury.

DO YOU HAVE A QUESTION?

QUESTION: What is the new program for scheduling jurors?

ANSWER: This is a new way of organizing and scheduling jurors that is being introduced all over the country. The goals of this program are to save money, increase the number of citizens who are summoned to serve and decrease the inconvenience of serving.

The program means that instead of calling jurors for two weeks, jurors now serve only one day, or for the length of one trial if they are selected to hear a case. Jurors who are not selected to hear a case are excused at the end of the day, and their obligations to serve as jurors are fulfilled for three years. The average trial lasts two days once testimony begins.

An important part of what is called the One Day – One Trial program is the "standby" juror. This is a person called to the Courthouse if the number of cases to be tried requires more jurors than originally estimated. Once called to the Courthouse, the standby becomes a "regular" juror, and his or her service is complete at the end of one day or one trial, the same as everyone else.

Q. How was I summoned?

A. The basic source for names of eligible jurors is the Driver's License list which is supplemented by the voter registration list. Names are chosen from these combined lists by a computer in a completely random manner.

Once in the Courthouse, jurors are selected for a trial by this same computer and random selection process.

Q. How is the Jury for a particular trial selected?

A. When a group of prospective jurors is selected, more than the number needed for a trial are called. Once this group has been seated in the courtroom, either the Judge or the attorneys ask questions. This is called *voir dire*. The purpose of questions asked during *voir dire* is to ensure that all of the jurors who are selected to hear the case will be unbiased, objective and attentive.

In most cases, prospective jurors will be asked to raise their hands when a particular question applies to them. Examples of questions often asked are: Do you know the Plaintiff, Defendant or the attorneys in this case? Have you been involved in a case similar to this one yourself? Where the answer is yes, the jurors raising hands may be asked additional questions, as the purpose is to guarantee a fair trial for all parties. When an attorney believes that there is a legal reason to excuse a juror, he or she will challenge the juror for cause. Unless both attorneys agree that the juror should be excused, the Judge must either sustain or override the challenge.

After all challenges for cause have been ruled upon, the attorneys will select the trial jury from those who remain by exercising peremptory challenges. Unlike challenges for cause, no reason need be given for excusing a juror by peremptory challenge. Attorneys usually exercise these challenges by taking turns striking names from a list until both are satisfied with the jurors at the top of the list or until they use up the number of challenges allowed. Challenged jurors and any extra jurors will then be excused and asked to return to the jury selection room.

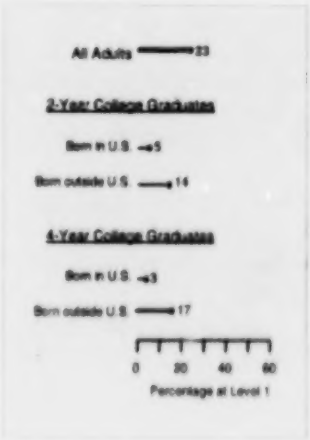
Jurors should not feel rejected or insulted if they are excused for cause by the Court or peremptorily challenged by one of the attorneys. The *voir dire* process and challenging of jurors is simply our judicial system's way of guaranteeing both parties to a lawsuit a fair trial.

Q. Am I guaranteed to serve on a jury?

A. Not all jurors who are summoned actually hear a case. Sometimes all the Judges are still working on trials from the previous day, and no new jurors are chosen. Normally, however, some new cases begin every day. Sometimes jurors are challenged and not selected.

DOCUMENT LITERACY, LEVEL 1 (0 TO 225)

One in 20 U.S. born two-year college graduates, and one in 33 four-year graduates are at Level 1 in Document Literacy. They can match information and fill in personal information on forms.



They can:

locate a piece of information based on a literal match between the task and the document or enter information from personal knowledge onto a document. Little, if any, distracting information is present.*

They are likely to succeed at tasks such as:

- Sign their names *(69)*
- Locate time of meeting on a form *(180)*
- Use a pie graph to locate type of vehicle having specific sales *(214)*

*However, some were at the lower end of this level where they could not perform even these routine tasks.

EXAMPLE TASK

You have gone to an employment center for help in finding a job. You know that this center handles many different kinds of jobs. Also, several of your friends who have applied here have found jobs that appeal to you.

The agent has taken your name and address and given you the rest of the form to fill out. Complete the form so the employment center can help you get a job.

Birth date_____ Age____ Sex: Male____ Female____

Height_____ Weight_____ Health_____

Last grade completed in school_____

Kind of work wanted:

Part-time_____ Summer_____

Full-time_____ Year-round_____

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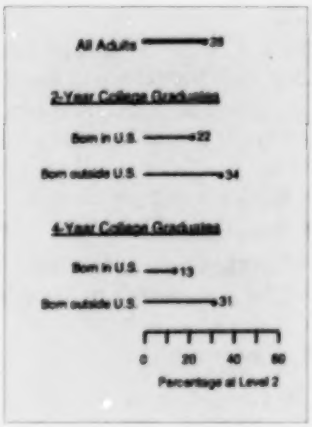
DOCUMENT LITERACY, LEVEL 2 (226 TO 275)

Just over one in five U.S. born two-year college graduates and about one in eight four-year graduates can match information in documents that contain distractors, and they can integrate information from several places in the document.



They can:

match a single piece of information, with distracting information present, or requiring a low level of inference. They may also integrate information from various parts of the document.

They are likely to succeed at tasks such as:

- Locate an intersection on a street map *(230)*
- Locate eligibility from table of employee benefits *(246)*
- Identify and enter background information on application for social security card *(259)*

EXAMPLE TASK

What is the gross pay for this year to date?

HOURS REGULAR	HOURS OVERTIME	HOURS TOTAL	PERIOD ENDING	REGULAR	OVERTIME	GROSS	DEF ANN	NET PAY
500		500	03/15/85					
			CURRENT	62500		62500		45988
			YEAR TO DATE			426885		

TAX DEDUCTIONS	FED W/H	STATE W/H	CITY W/H	FICA
CURRENT	10894	1375		3831
YEAR TO DATE	73498	8250		26167

OTHER DEDUCTIONS	CR UNION		UNITED FD	PERS INS	MISC	U-SC CODE

NON-NEGOTIABLE

OTHER DEDUCTIONS CODE	TYPE	AMOUNT	CODE	TYPE	AMOUNT
07	DEN	412			

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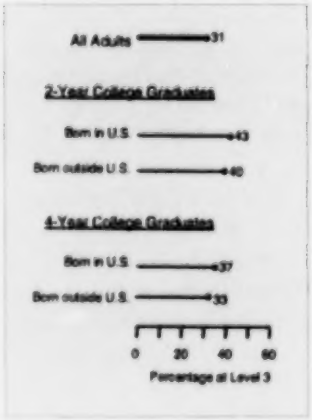
DOCUMENT LITERACY, LEVEL 3 (276 TO 325)

Over two in five U.S. born two-year college graduates and over one in three four-year graduates are at Level 3 in Document Literacy. They can integrate several pieces of information and deal with rather complex tables and graphs that contain information not pertaining to the task.



They can:

integrate several pieces of information from one or several documents and deal with rather complex tables or graphs containing information that is irrelevant or inappropriate to the task.

They are likely to succeed at tasks such as:

- Identify information from bar graph depicting source of energy and year *(277)*
- Use sign out sheet to respond to call about resident *(298)*
- Enter information given into an automobile maintenance record form *(323)*

EXAMPLE TASK

You need to smooth wood in preparation for sealing and plan to buy garnet sandpaper. What type of sandpaper should you buy?

ABRASIVE SELECTION GUIDE

MATERIAL & OPERATION	PRODUCTION®					GARNET				WETORDRY®				FRE-CUT®		EMERY		
	EC	C	M	F	EF	C	M	F	EF	VF	EF	SF	UF	VF	EF	C	M	F
WOOD																		
Paint Removal	■	■				■												
Heavy Stock Removal			■				■											
Moderate Stock Removal				■				■										
Preparation for Sealing					■				■									
After Sealer											■				■			
Between Coats												■						
After Final Coat													■					
METAL																		
Rust and Paint Removal	■	■														■		
Light Stock Removal			■															
Preparation for Priming				■													■	
Finishing and Polishing					■													■
After Primer											■				■			
Between Coats												■						
After Final Coat													■					
PLASTIC & FIBERGLASS																		
Shaping	■	■																
Light Stock Removal			■															
Finishing & Scuffing				■	■									■	■			

EC = Extra Coarse C = Coarse M = Medium F = Fine VF = Very Fine EF = Extra Fine SF = Super Fine UF = Ultra Fine

SAFETY INFORMATION:

- Wear approved safety goggles when sanding.
- Use particle/dust mask or other means to prevent inhalation of sanding dust.
- When using power tools, follow manufacturer's recommended procedures and safety instructions.

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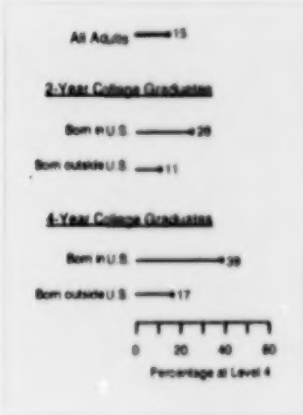
One in four U.S. born two-year college graduates and two in five four-year graduates are at Level 4. They can do tasks requiring greater inferences and involving more detailed information.



They can:
perform tasks that require them to draw higher level inferences and numerous responses without being told how many are needed. They can also perform tasks that contain conditional information.

They are likely to succeed at tasks such as:
- Identify the correct percentage meeting specified conditions from a table of such information *(342)*
- Use a bus schedule to determine appropriate bus for given set of conditions *(352)* (See below)
- Use a table of information to determine pattern in oil exports across years *(352)*

EXAMPLE TASK

On Saturday afternoon, if you miss the 2:35 bus leaving Hancock and Buena Ventura going to Flintridge and Academy, how long will you have to wait for the next bus?

A Until 2:57 p.m. **B** Until 3:05 p.m. **C** Until 3:35 p.m. **D** Until 3:57 p.m. **E** I don't know

ROUTE **5**

VISTA GRANDE

This bus line operates Monday through Saturday providing "local service" to most neighborhoods in the northeast section.
Buses run thirty minutes apart during the morning and afternoon rush hours Monday through Friday.
Buses run one hour apart at all other times of day and Saturday.
No Sunday, holiday or night service.

OUTBOUND
from Terminal

	Leave Downtown Terminal	Leave Hancock and Buena Ventura	Leave Oakdale	Leave Pueblo Hills	Leave North Carolina and Ora Blanca	Arrive Flintridge and Academy
AM	6:20	6:35	6:45	6:50	7:03	7:15
	6:50	7:05	7:15	7:20	7:33	7:45
	7:20	7:35	7:45	7:50	8:03	8:15
	7:50	8:05	8:15	8:20	8:33	8:45
	8:20	8:35	8:45	8:50	9:03	9:15
	8:50	9:05	9:15	9:20	9:33	9:45
	9:20	9:35	9:45	9:50	10:03	10:15
	10:20	10:35	10:45	10:50	11:03	11:15
	11:20	11:35	11:45	11:50	12:03	12:15
PM	12:20	12:35	12:45	12:50	1:03	1:15
	1:20	1:35	1:45	1:50	2:03	2:15
	2:20	2:35	2:45	2:50	3:03	3:15
	2:50	3:05	3:15	3:20	3:33	3:45
	3:20	3:35	3:45	3:50	4:03	4:15
	3:50	4:05	4:15	4:20	4:33	4:45
	4:20	4:35	4:45	4:50	5:03	5:15
	4:50	5:05	5:15	5:20	5:33	5:45
	5:20	5:35	5:45	5:50	6:03	6:15
	5:50	6:05	6:15	6:20	6:33	6:45
	6:20	6:35	6:45	6:50	7:03	7:15

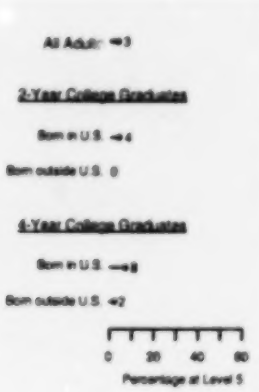
INBOUND
toward Terminal

Leave Flintridge and Academy	Leave North Carolina and Ora Blanca	Leave Pueblo Hills	Leave Oakdale	Leave Hancock and Buena Ventura	Arrive Downtown Terminal
6:15	6:27	6:42	6:47	6:57	7:15
6:45	6:57	7:12	7:17	7:27	7:45 Monday through Friday only
7:15	7:27	7:42	7:47	7:57	8:15
7:45	7:57	8:12	8:17	8:27	8:45 Monday through Friday only
8:15	8:27	8:42	8:47	8:57	9:15
8:45	8:57	9:12	9:17	9:27	9:45 Monday through Friday only
9:15	9:27	9:42	9:47	9:57	10:15
9:45	9:57	10:12	10:17	10:27	10:45 Monday through Friday only
10:15	10:27	10:42	10:47	10:57	11:15
11:15	11:27	11:42	11:47	11:57	12:15
12:15	12:27	12:42 p.m.	12:47 p.m.	12:57 p.m.	1:15 p.m.
1:15	1:27	1:42	1:47	1:57	2:15
2:15	2:27	2:42	2:47	2:57	3:15
3:15	3:27	3:42	3:47	3:57	4:15
3:45	3:57	4:12	4:17	4:27	4:45 Monday through Friday only
4:15	4:27	4:42	4:47	4:57	5:15
4:45	4:57	5:12	5:17	5:27	5:45 Monday through Friday only
5:15	5:27	5:42	5:47	5:57	6:15
5:45	5:57	6:12	6:17	6:27	6:45 Monday through Friday only
					Monday through Friday only

You can transfer from this bus to another headed anywhere else in the city bus system

To be sure of a smooth transfer tell the driver of this bus the name of the second bus you need.

Just one in 25 U.S. born two-year college graduates and one in 12 four-year graduates are at Document Level 5. They can use complex documents that contain distracting information and can make high level inferences.



They can:

search through complex displays that contain several pieces of distracting information, make high level inferences from the text, and make use of specialized knowledge.

They are likely to succeed at tasks such as:

- **Use information in a table to complete a graph including labeling axes *(378)***
- **Use a table to compare credit cards; identify the two categories used and write two differences between them *(387)***
- **Use a table depicting information about parental involvement in a school survey to write paragraph summarizing the extent to which parents and teachers agree *(395)*** (See below)

EXAMPLE TASK

Using the information in the table, write a brief paragraph summarizing the extent to which parents and teachers agreed or disagreed on the statements about issues pertaining to parental involvement at their school.

Parents and Teachers Evaluate Parental Involvement at Their School

Do you agree or disagree that . . . ?

	Total	Level of School		
		Elementary	Junior High	High School
		percent agreeing		
Our school does a good job of encouraging parental involvement in sports, arts, and other nonsubject areas				
Parents	77	76	74	79
Teachers	77	73	77	85
Our school does a good job of encouraging parental involvement in educational areas				
Parents	73	82	71	64
Teachers	80	84	78	70
Our school only contacts parents when there is a problem with their child				
Parents	55	46	62	63
Teachers	23	18	22	33
Our school does not give parents the opportunity for any meaningful roles				
Parents	22	18	22	28
Teachers	8	8	12	7

Source: The Metropolitan Life Survey of the American Teacher, 1987

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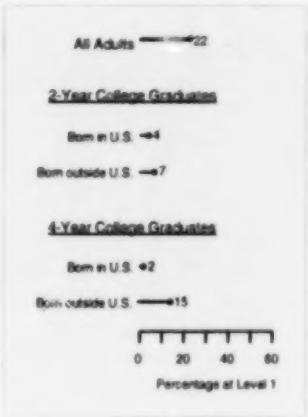
One in 25 U.S. born two-year college graduates and one in 50 four-year graduates are at Quantitative Literacy Level 1. They can perform single, relatively simple operations.



They can:
perform a single, relatively simple arithmetic operation, such as addition. The numbers to be used are provided, and the operation to be performed is specified.*

They are likely to succeed at tasks such as:
- Total a bank deposit entry *(191)* (See below)

*However, some were at the lower end of this level where they could not perform even these routine tasks.

EXAMPLE TASK

You wish to use the automatic teller machine at your bank to make a deposit. Figure the total amount of the two checks being deposited. Enter the amount on the form in the space next to TOTAL.

Availability of Deposits

Funds from deposits may not be available for immediate withdrawal. Please refer to your institution's rules governing funds availability for details.

Crediting of deposits and payments is subject to verification and collection of actual amounts deposited or paid in accordance with the rules and regulations of your financial institution.

PLEASE PRINT

YOUR MAC CARD NUMBER (No PINs PLEASE)
111 222 3334

YOUR FINANCIAL INSTITUTION
Union Bank

YOUR ACCOUNT NUMBER
987 555 674

YOUR NAME
Chris Jones

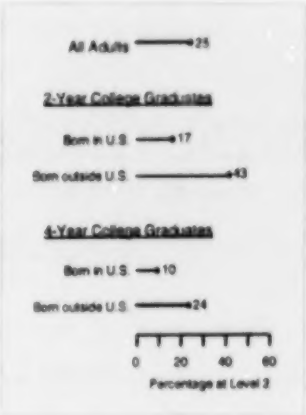
CHECK ONE ☐ DEPOSIT or ☐ PAYMENT

CASH	$	00
LIST CHECKS BY BANK NO.	ENDORSE WITH NAME & ACCOUNT NUMBER	
	557	19
	75	00
TOTAL		

DO NOT DETACH TICKET

DO NOT FOLD NO COINS OR PAPER CLIPS PLEASE

One in six U.S. born two-year college graduates and one in 10 four-year graduates are at Level 2. They can perform an arithmetic operation using numbers given to them or easily located in the material.



They can:

perform a single arithmetic operation using numbers that are given in the task or easily located in the material. The operation to be performed is either described in the task or easily determined from the format of the materials (for example, an order form).

They are likely to succeed at tasks such as:

- Calculate postage and fees for certified mail *(238)*
- Determine the difference in price between tickets for two shows *(246)* (See below)
- Calculate the total costs of purchase from an order form *(270)*

EXAMPLE TASK

The price of one ticket and bus for "Sleuth" costs how much less than the price of one ticket and bus for "On the Town"?

THEATER TRIP

A charter bus will leave from the bus stop (near the Conference Center) at 4 p.m., giving you plenty of time for dinner in New York. Return trip will start from West 45th Street directly following the plays. Both theaters are on West 45th Street. Allow about 1½ hours for the return trip.

Time:	4 p.m., Saturday, November 20		
Price:	"On the Town"	Ticket and bus	$11.00
	"Sleuth"	Ticket and bus	$8.50
Limit:	Two tickets per person		

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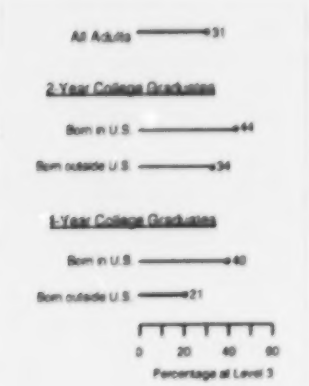
Over two in five U.S. born two-year college graduates and two in five four-year graduates are at Level 3. They can solve problems with two or more numbers that must be found in printed material.



They can:

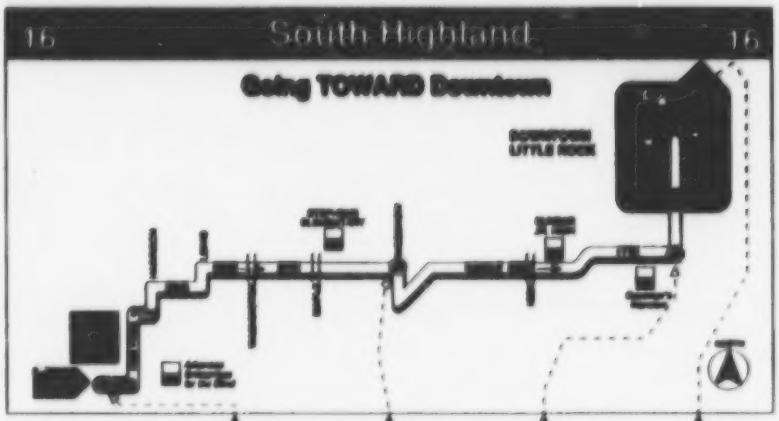
perform tasks where two or more numbers are typically needed to solve the problem, and these must be found in the material. The operation(s) needed can be determined from the arithmetic relation terms used in the question or directive.

They are likely to succeed at tasks such as:

- Use calculator to calculate differences between regular and sale price from an advertisement *(278)*
- Use calculator to determine the discount from an oil bill if paid within 10 days *(308)*
- Calculate miles per gallon using information given on mileage record chart *(321)*

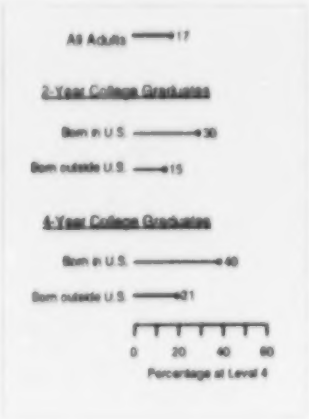
EXAMPLE TASK

Suppose that you took the 12:45 p.m. bus from U.A.L.R. Student Union to 17th and Main on a Saturday. According to the schedule, how many minutes is the bus ride?



WEEKDAY					
A.M.	♿	6:36	6:51	6:00	6:00
		6:11	6:26	6:35	6:45
	♿	6:41	6:56	7:00	7:15
		7:11	7:26	7:35	7:45
	♿	7:41	7:56	8:00	8:15
		8:11	8:26	8:35	8:45
	♿	8:41	8:56	9:00	9:15
		9:14	9:27	9:36	9:45
	♿	9:44	9:57	10:06	10:15
		10:14	10:27	10:36	10:46
	♿	10:44	10:57	11:06	11:15
		11:14	11:27	11:36	11:45
	♿	11:44	11:57	12:06	12:15
P.M.	♿	12:14	12:27	12:36	12:46
	♿	12:44	12:57	1:06	1:15
		1:14	1:27	1:36	1:46
	♿	1:44	1:57	2:06	2:15
		2:14	2:27	2:36	2:46
	♿	2:44	2:57	3:06	3:15
		3:14	3:27	3:36	3:46
	♿	3:43	3:56	4:06	4:15
		4:13	4:26	4:35	4:46
	♿	4:43	4:56	5:06	5:15
		5:13	5:26	5:36	5:46
	♿	5:43	5:56	6:07	6:17
		6:11	6:23	6:36	–
	♿	6:46	6:57	7:06	–
SATURDAY					
A.M.	♿	6:36	6:51	6:00	6:00
	♿	6:46	6:57	7:06	7:15
	♿	7:46	7:57	8:06	8:15
	♿	8:46	8:57	9:06	9:15
	♿	9:46	9:57	10:06	10:15
	♿	10:46	10:57	11:06	11:15
	♿	11:46	11:57	12:06	12:16
P.M.	♿	12:46	12:57	1:06	1:16
	♿	1:46	1:57	2:06	2:16
	♿	2:46	2:57	3:06	3:16
	♿	3:46	3:57	4:06	4:16
	♿	4:46	4:57	5:06	5:16
	♿	5:46	5:57	6:06	6:16
	♿	6:44	6:56	7:06	–

Three in 10 U.S. born two-year graduates and two in five four-year graduates are at Level 4 in Quantitative Literacy. They can solve problems with two or more numbers that must be found in printed material.



They can:
perform two or more operations in sequence or a single operation in which the quantities are found in different types of displays, or where the operations must be inferred from the information given or from prior knowledge.

They are likely to succeed at tasks such as:
- Determine correct change using information in a menu *(331)*
- Use information stated in news article to calculate amount of money that should go to raising a child *(350)*
- Use the eligibility pamphlet to calculate the yearly amount a couple would receive for basic supplemental security income *(368)*

EXAMPLE TASK

Estimate the cost per ounce of the creamy peanut butter. Write your estimate on the line provided.

Unit price	You pay
11.8¢ per oz.	1.89
rich chnky pnt bt	
10693	16 oz.

Unit price	You pay
1.59 per lb.	1.99
creamy pnt butter	
10732	20 oz.

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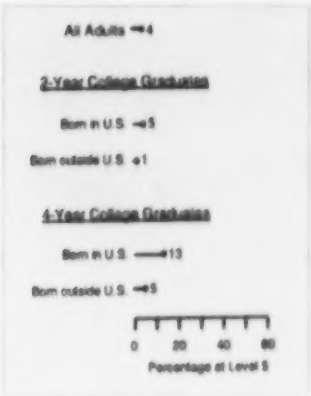
One in 20 U.S. born two-year college graduates and one in 8 four-year graduates perform at Quantitative Literacy Level 5. They can handle two or more arithmetic operations in sequence.



They can:
perform multiple operations sequentially. They can also find the features of problems embedded in the text or rely on background knowledge to determine the quantities or operations needed.

They are likely to succeed at tasks such as:

- Determine shipping and total costs on an order form for items in a catalog *(382)*
- Use information in news article to calculate difference in time for completing a race *(405)*
- Use a calculator to determine the total cost of carpet to cover a room *(421)*

EXAMPLE TASK

You need to borrow $10,000. Find the ad for Home Equity Loans on page 2 in the newspaper provided. Explain to the interviewer how you would compute the total amount of interest charges you would pay under this loan plan. Please tell the interviewer when you are ready to begin.

FIXED RATE • FIXED TERM

HOME EQUITY LOANS

14.25%
Annual Percentage Rate
Ten Year Term

SAMPLE MONTHLY REPAYMENT SCHEDULE

Amount Financed	Monthly Payment
$10,000	$156.77
$25,000	$391.93
$40,000	$627.09

120 Months 14.25% APR

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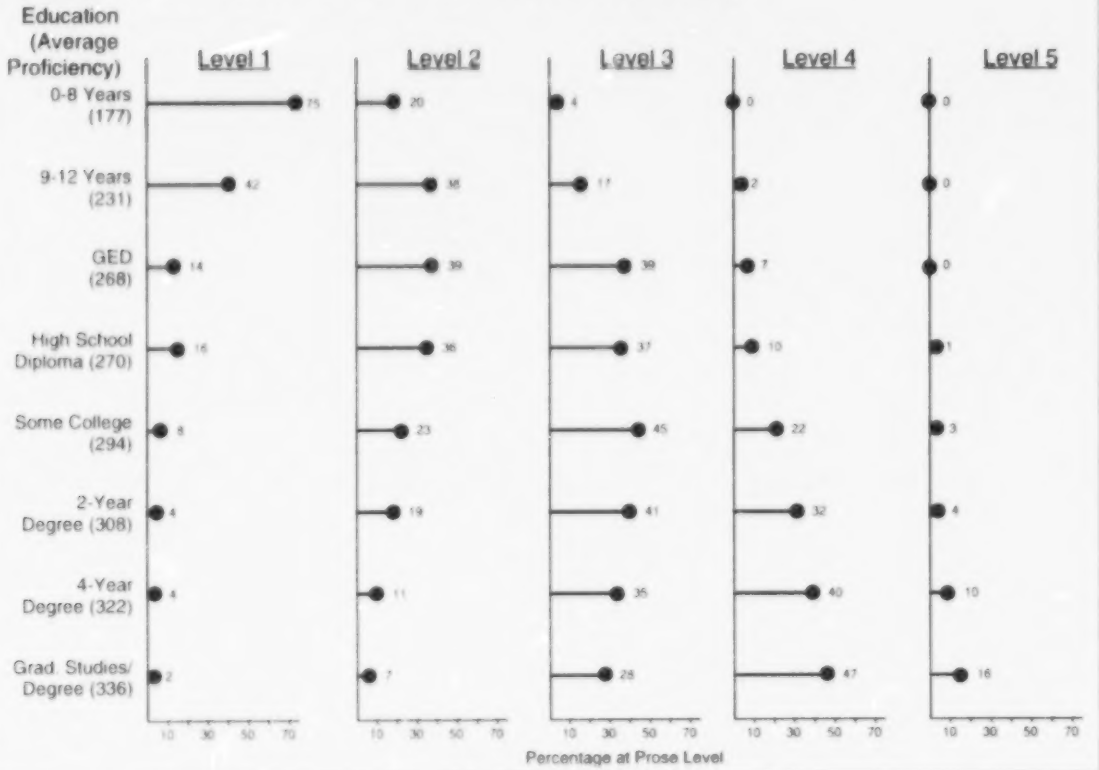
Literacy and Levels of Education

It is not surprising that on the average, the higher the level of one's education, the higher the level of literacy (see Figure 5). Education results in greater literacy, and greater literacy enables one to pursue more advanced education. Whether the level of literacy seems adequate for particular levels of certified educational attainment is another question, and we address this in the conclusion to this section on literateness.

From *Adult Literacy in America*, Irwin Kirsch et al., Educational Testing Service, under contract with the National Center for Education Statistics, 1993.

Prose proficiency tends to rise with education level. Three-fourths of adults with between zero and eight years of school are in Level 1, as are four in 10 high school dropouts. Over 75 percent of two-year college graduates and 85 percent of four-year college graduates reach at least Level 3. However, just 4 and 10 percent, respectively, reach Level 5.

Figure 5: Education Level and Prose Proficiency



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The Distribution of Prose Proficiency by Education Level

Proficiency with prose materials varies significantly at each level of educational attainment. This has been found to be true of achievement in reading and mathematics at each grade level as well.

As shown in Figure 6, the top 25 percent of high school graduates score higher than the bottom 25 percent of four-year college graduates.

Both admission and graduation requirements vary widely in the U.S. Getting a fix on outcomes and making comparisons over time will require recognizing this fact. We will want to know about the kind of college and the backgrounds of the students entering them. This survey of literateness does not identify the type of college respondents graduated from.

Special tabulations from the *National Adult Literacy Study*, 1992.

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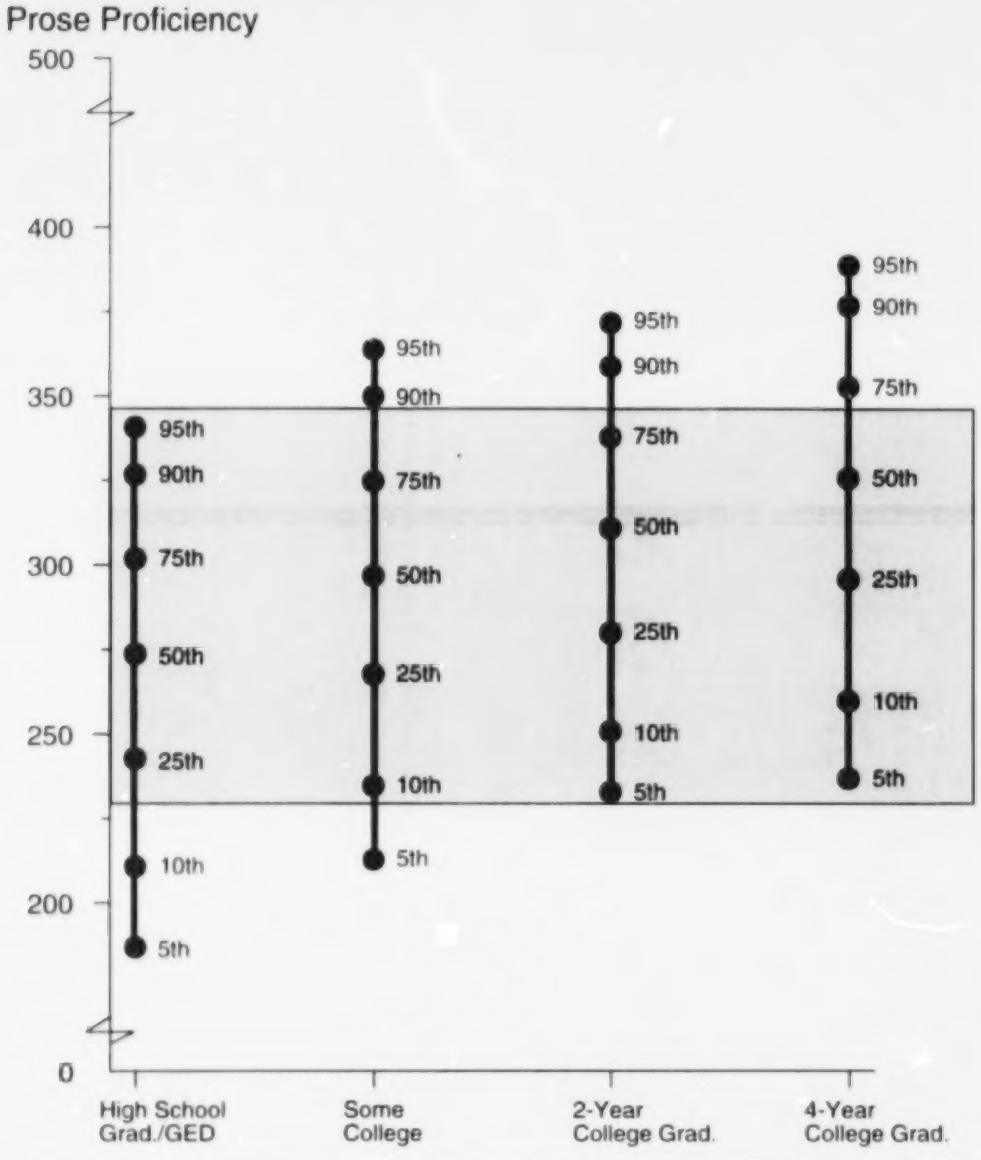
Prose proficiency varies significantly at each education level, although there is a large overlap in the score distributions. For example, the top 25 percent of high school graduates score higher than the bottom 25 percent of four-year college graduates.

Figure 6: Percentile Distribution of Prose Literacy Proficiency by Education Level, 1992



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Literacy and Weeks Worked

Among all adults there is a steady rise in the number of weeks worked during the year with increasing literacy proficiency, whether Prose, Document, or Quantitative (see Figure 7). The extensive analysis of the literacy study has shown the many advantages in the labor market that go hand-in-hand with higher literacy levels.

This holds true for college graduates as well, although the average number of weeks worked is fairly flat at the higher literacy levels, while it keeps rising after Literacy Level 3 in the whole adult population.

From *Adult Literacy in America*, Irwin Kirsch et al., Educational Testing Service, under contract with the National Center for Education Statistics, 1993.

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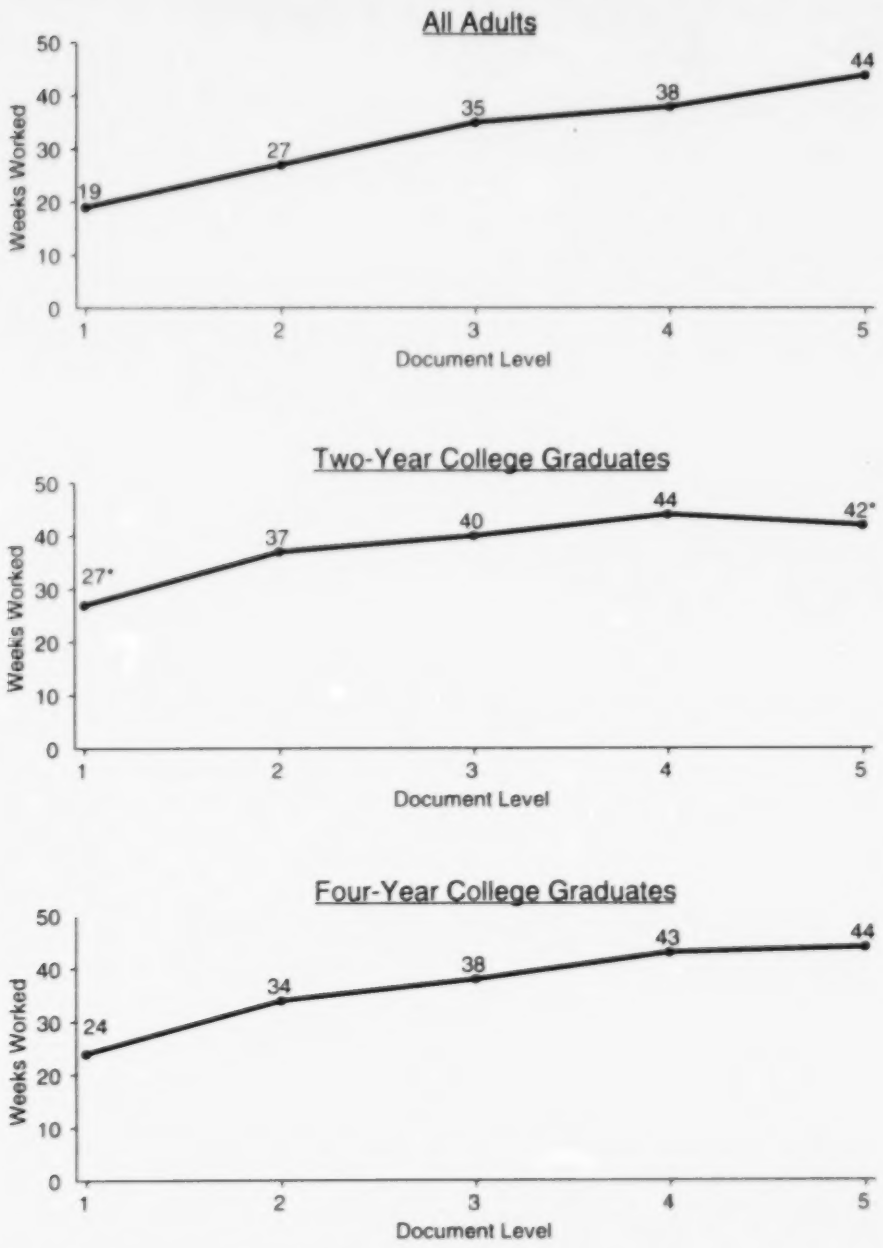
College graduates work more weeks during the year. Among college graduates, those at higher literacy levels work more weeks.

Figure 7: Document Literacy and Weeks Worked



*High standard errors due to small number in sample.

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Literacy and Weekly Wages

The higher the literacy level, the higher are average wages. This is true for high school graduates and those with two- or four-year college degrees.

While wages rise with literacy level, Figure 8 also shows that higher wages are associated with higher educational attainment. At each literacy level, four-year graduates have higher average wages than two-year graduates, who have higher average wages than high school graduates.

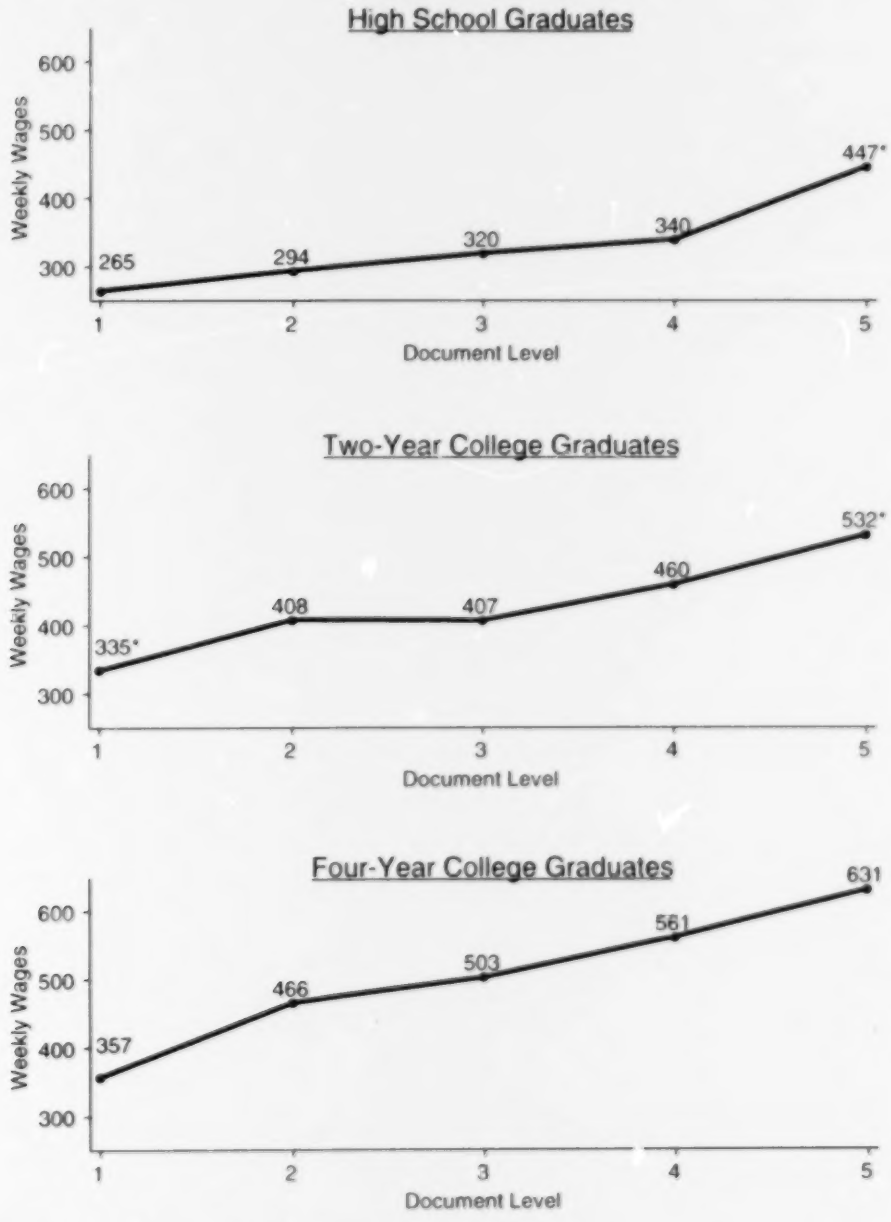
From *Adult Literacy in America*, Irwin Kirsch et al., Educational Testing Service, under contract with the National Center for Education Statistics, 1993.

Some differences in average wages, from one literacy level to the next, are not statistically significant; those with high standard errors are marked with an asterisk.

50

College graduates have higher average weekly wages than two-year graduates, who have higher average earnings than high school graduates.
Among college graduates, wages rise with literacy levels.

Figure 8: Document Literacy and Weekly Wages



*High standard errors due to small number in sample.

51

Literacy and Age of College Graduates

Older college graduates tend to have substantially lower Prose Literacy proficiencies than do younger graduates (see Figure 9). Nine percent of two-year graduates, age 55 and over, are at Literacy Level 1, as are 8 percent of four-year graduates. The average score proficiency of this age group is at the low end of the Literacy Level 3 range for two-year graduates and about the middle of this Level for four-year graduates.

From *Adult Literacy in America*, Irwin Kirsch et al, Educational Testing Service, under contract with the National Center for Education Statistics, 1993.

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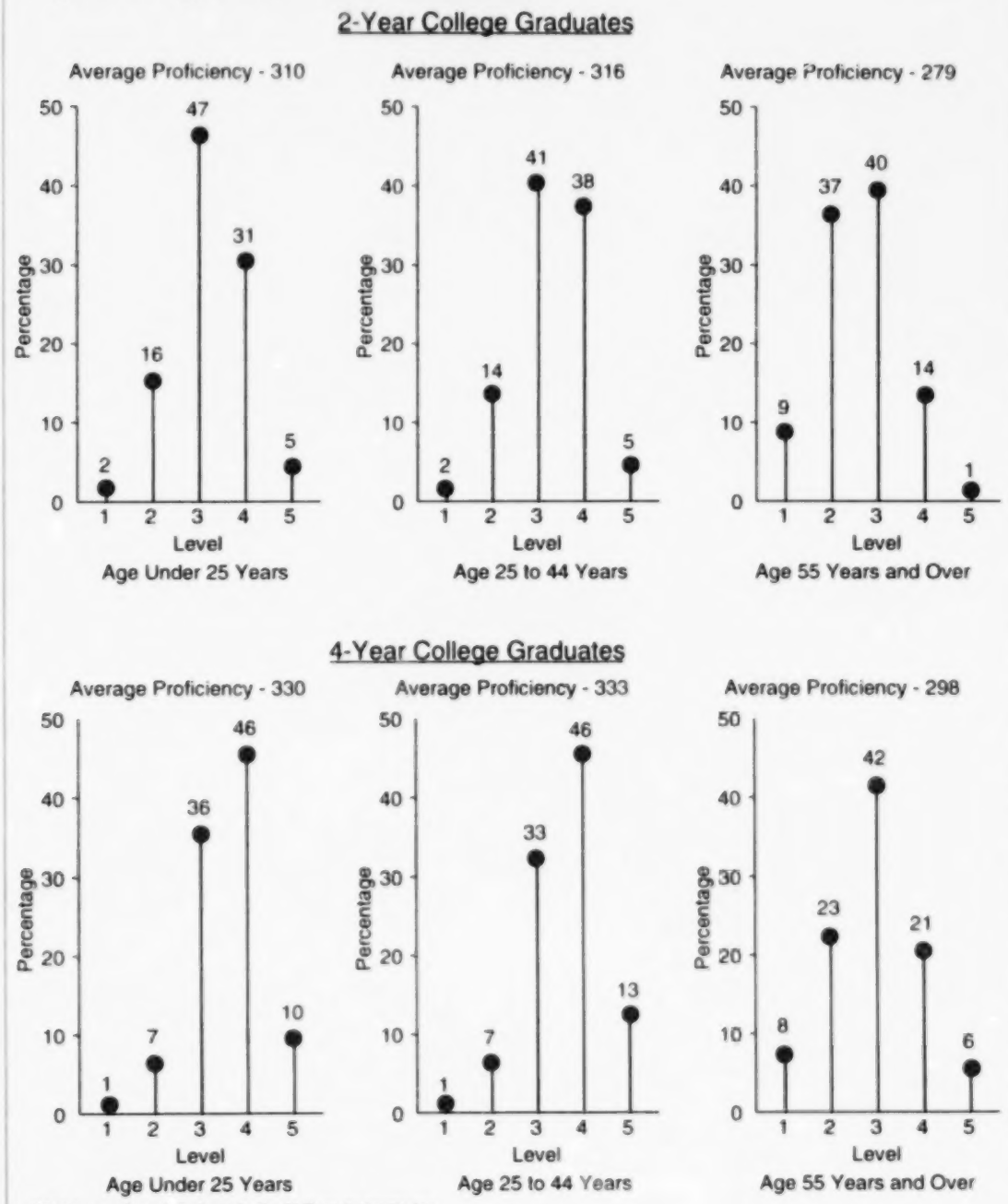
While there is little difference in the literacy proficiencies of graduates age 16 to 24 and those age 25 to 44, graduates age 55 and over have substantially lower literacy levels.

Figure 9: Age and Prose Proficiency



All data are for adults born in the U.S. or its territories.

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Literacy and Age of College Graduates (Continued)

As described in the prior chart, older college graduates have lower literacy proficiency levels. Figure 10 shows more specifically how age and literacy level are related. For two-year graduates, there is a drop of 13 years in average age from Prose Level 1 to Prose Level 5. There is little difference in mean age, however, between Levels 3 and 5. The age difference for four-year graduates is roughly the same.

From *Adult Literacy in America*, Irwin Kirsch et al, Educational Testing Service, under contract with the National Center for Education Statistics, 1993.

While average age is lower at each progression to a higher level, not all differences from one progression to the next are statistically significant.

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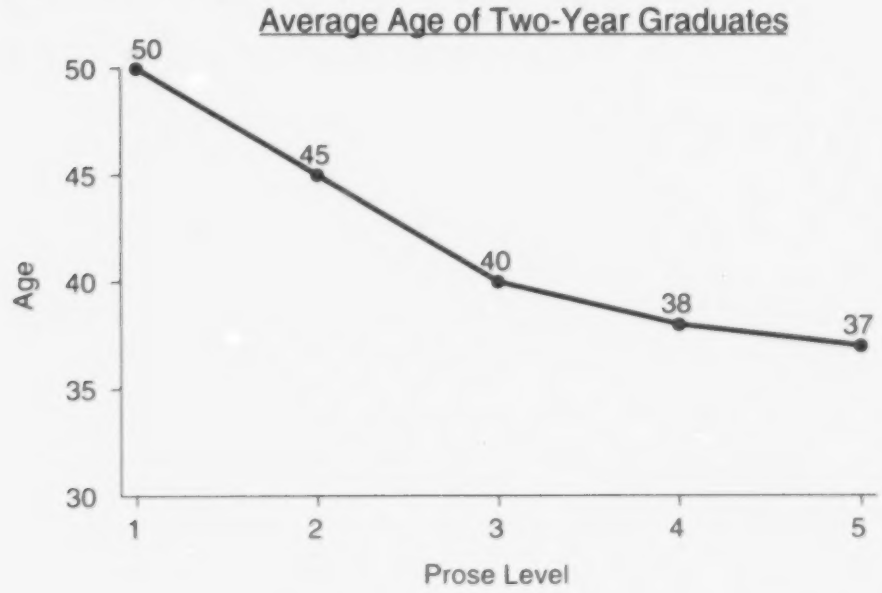
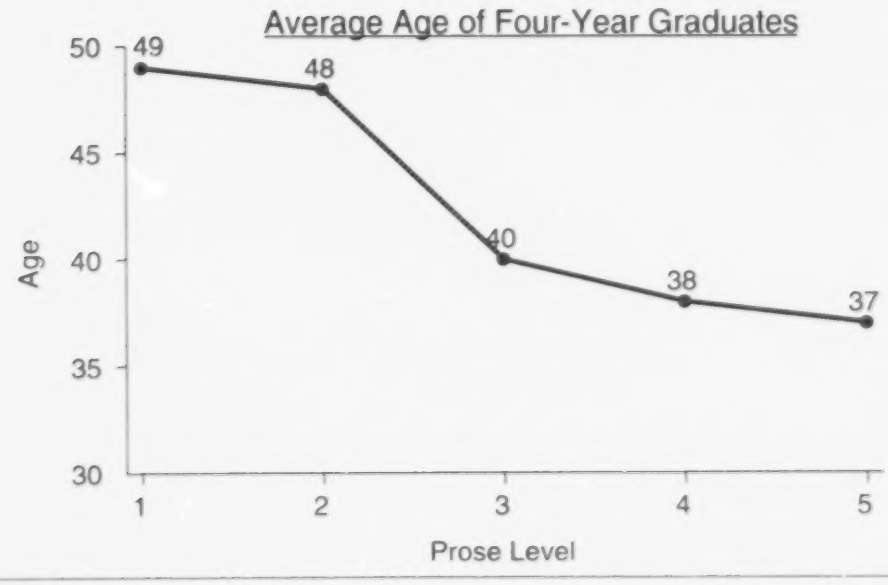
Whether with two- or four-year degrees, older college graduates have lower average literacy levels than younger graduates, with average age generally lower at each increment increase in literacy level.

Figure 10: Literacy and Age of College Graduates





Literacy and the Generations

As can be seen in Figure 11, the relationship between education and literacy is intergenerational.

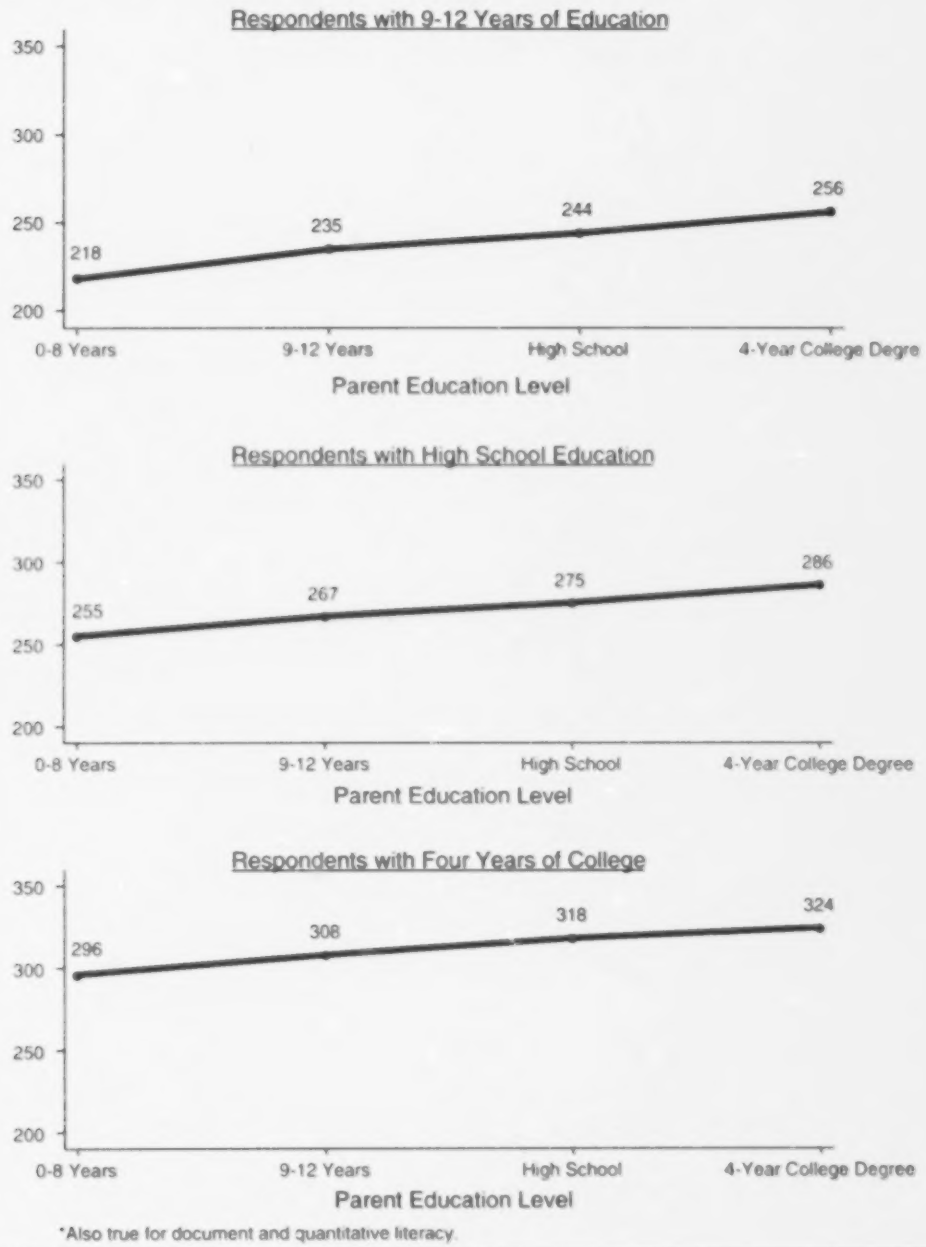
For respondents at each educational level, the higher the education of their parents, the higher are their average literacy proficiencies. For example, respondents with 9-12 years of education, whose parents were college graduates, had literacy levels the same as high school graduates whose parents had less than a ninth-grade education.

For four-year college graduates, average proficiencies ranged from 296 to 324, depending on the education level of their parents.

From *Adult Literacy in America*, Irwin Kirsch et al., Educational Testing Service, under contract with the National Center for Education Statistics, 1993.

Parent's education greatly influences the literacy levels reached by their children. Even among respondents with similar levels of education, those with better educated parents tend to have higher prose literacy proficiencies.*

Figure 11: Prose Literacy and Parent Education



*Also true for document and quantitative literacy.

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AFTER GRADUATION

Life after the college degree revolves around entering the labor market, continuing education, and having a family, or some combination of these. While we ascribe many desirable purposes to seeking a college degree, it would be fair to say that we expect greatly enhanced prospects of doing well in the labor market, landing in the more prestigious occupations, reducing prospects for unemployment, and earning higher salaries. And college graduates, we know, do better on all these counts.

We can determine how well college graduates are doing a year after receiving a bachelor's degree from the surveys conducted by the National Center for Education Statistics. The last such data are available for 1991. For some labor market activities, comparable data are also available for 1976, 1981, 1985, and 1991, so measurement of trends is possible.

While such trend information helps inform us as to how college graduates have been faring over the past 15 years, business cycles play a large role. Graduates leaving school in a recession will not do as well, irrespective of the long-term trend, and with only a few data points it is hard to distinguish long-term trends from business cycles.

The same data permit tracking college graduates who enroll in further education, and this can be done separately by major. It is necessary to keep both outcomes in mind — employment and further education — when judging how well students in a particular field are doing. For example, biology majors are least likely to be employed full-time a year after graduation, but they are most likely to be continuing their educations. Those in business and management are most likely to be employed and least likely to be continuing their educations.

This section provides information on:

- Trends on employment in field of study, and on employment in jobs not requiring a four-year degree
- Employment by major
- Trends in unemployment, full-time employment, and further education
- Further education by major
- Trends in salary and ratio of female to male salaries by major
- Salary change, by major, from 1976 to 1991
- Occupational distribution by major

Employment in Field of Study and in Fields Not Requiring a Four-Year Degree

Since 1985, there has been little change in the proportion of recent college graduates that have jobs related to their field of study, about three in four. These data are shown in Figure 12.

However, more have jobs that do not require a four-year college degree, rising from 37 percent in 1985 and 36 percent in 1987 to 44 percent in 1991.

Source: National Center for Education Statistics, *Survey of Recent College Graduates*, report for 1991 survey.

About three-fourths of employed Bachelor's degree recipients are in jobs related to their field of study, unchanged from 1985 and 1987. However, 44 percent were in jobs not requiring a four-year degree, up from 1985 and 1987.

Figure 12: Percentage of Employed Graduates in Jobs Related to Field of Study, 1985 - 1991

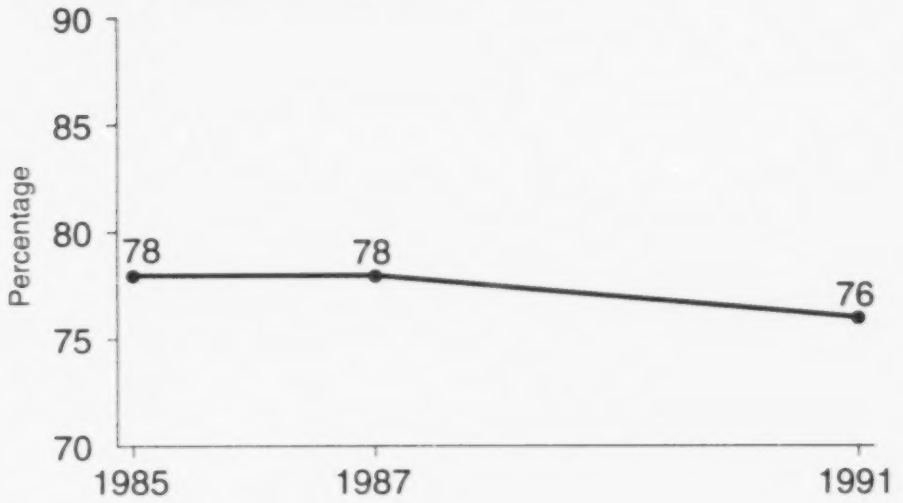
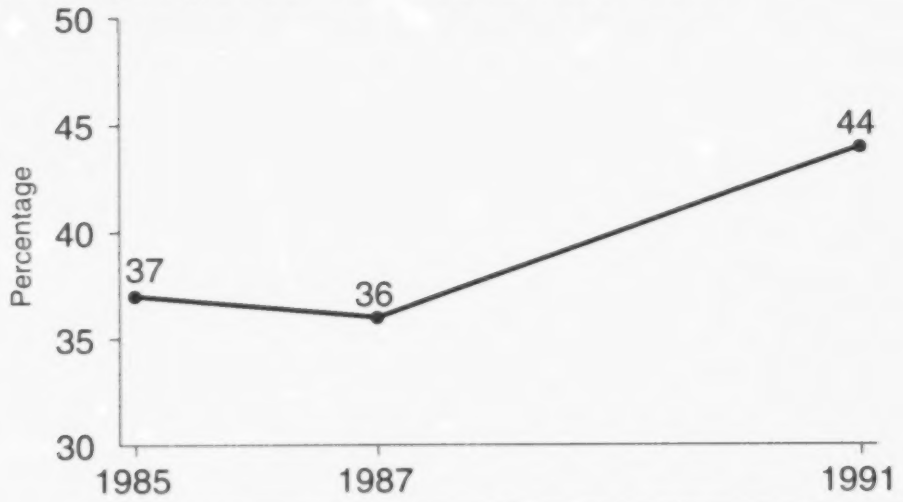


Figure 13: Percentage of Employed Graduates in Jobs Not Requiring a Four-Year Degree, 1985 - 1991



Employment by Major

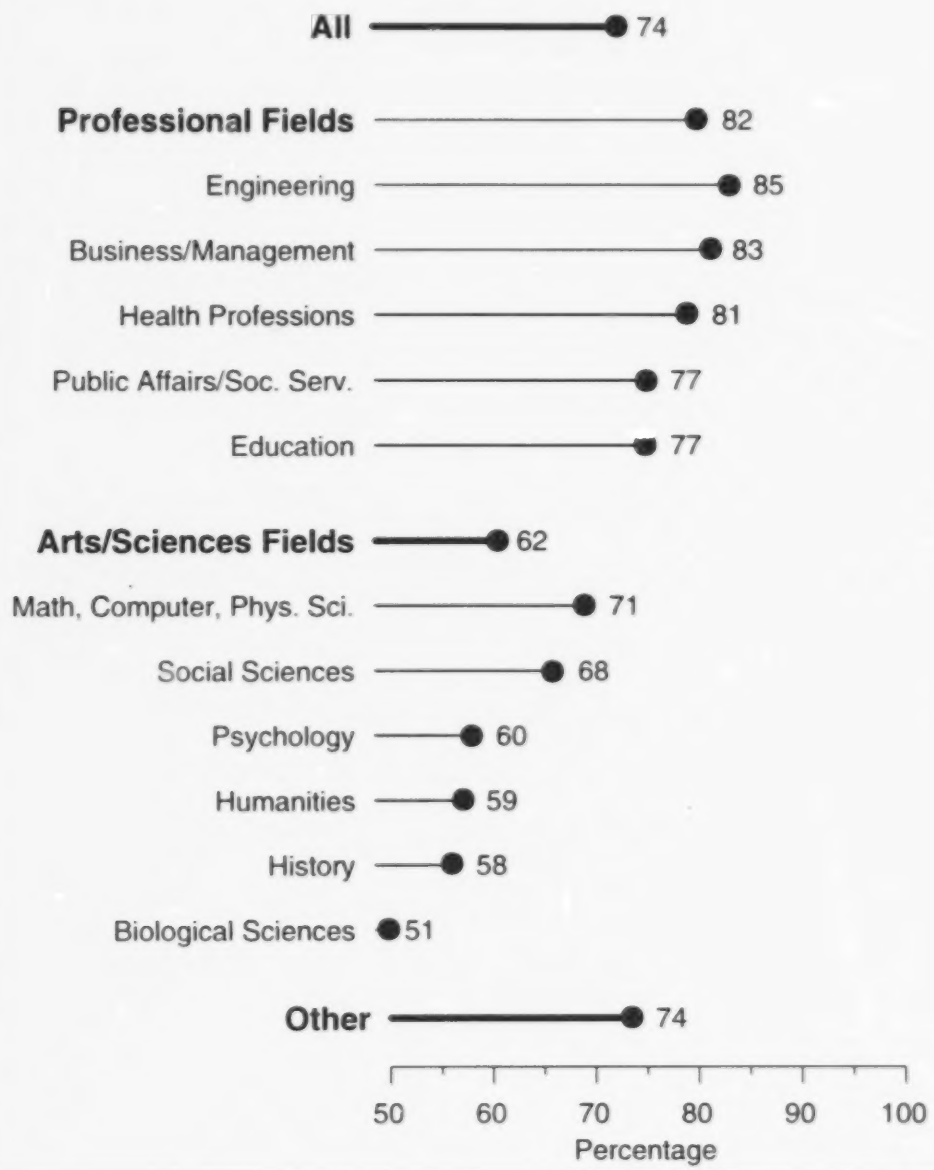
In general, those graduates with degrees in professional fields are most likely to be employed full-time one year after graduation, particularly those with business/management and engineering degrees (see Figure 14).

In the arts and sciences, those with degrees in the biological sciences are least likely to be employed (and, as can be seen in Figure 19, the most likely to continue their educations). Those most likely to work full-time have degrees in mathematics, computer sciences, and physical sciences.

Source: National Center for Education Statistics, *Survey of Recent College Graduates*, report for 1991 survey.

Recent degree holders with business management, education, and engineering degrees are most likely to be employed full-time one year after graduation. Biology degree holders are the least likely.

Figure 14: Percentage of 1989-90 Graduates Employed Full-Time in 1991



Employment Relationship to Field of Study

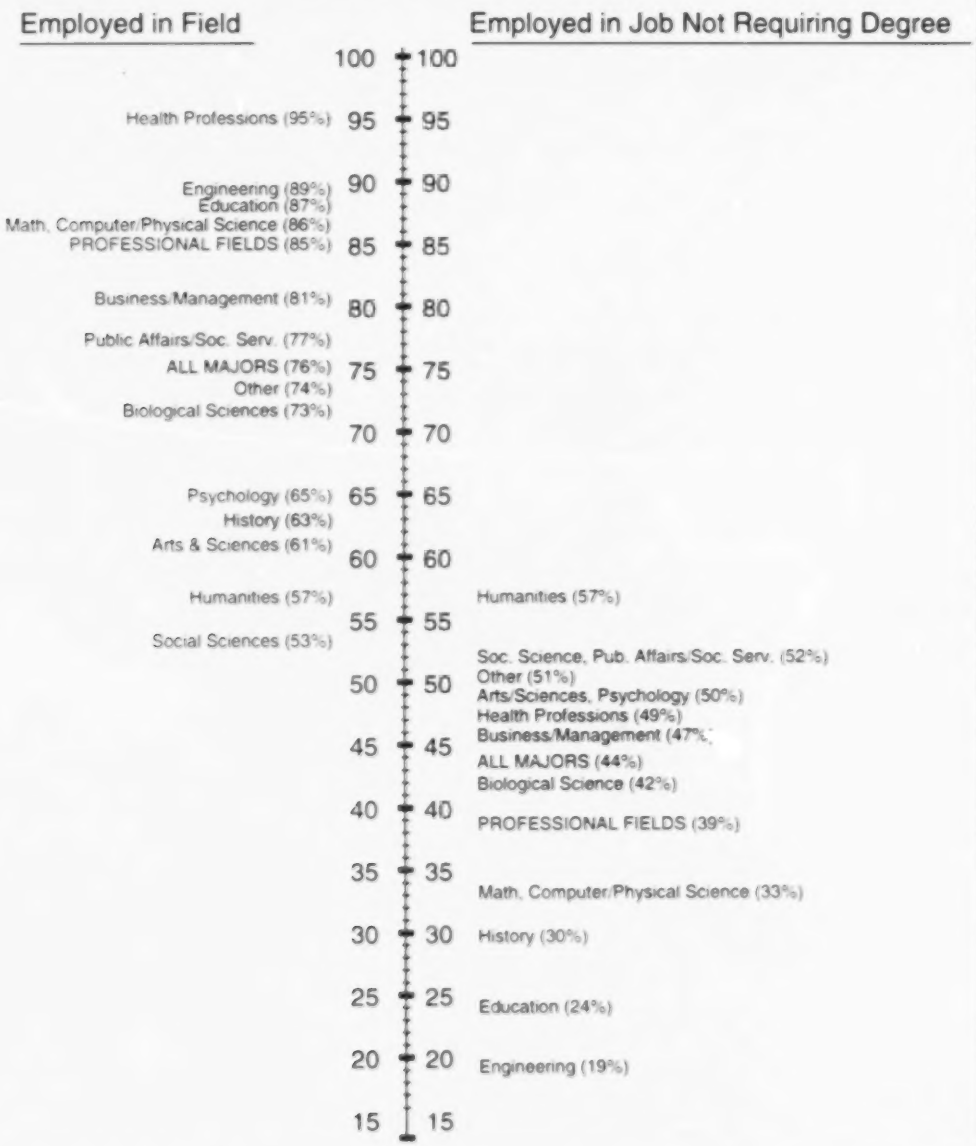
There is large variation in the percentage of recent graduates whose jobs are related to their field of study, from 95 percent in the health professions to 53 percent in the social sciences (see Figure 15). Of course, those pursuing degrees in professional areas have a higher expectation of a close relationship than those with more general education.

There is also considerable variation across the fields of study in the percentage of recent graduates who are employed in jobs that do not require a four-year degree. The range is from 63 percent for graduates with a history degree, to 19 percent among engineering graduates. Of course, those just one year out of college have had little time to make a connection to jobs with higher education requirements, and this will change for many as they develop experience in and knowledge of the labor market.

Source: National Center for Education Statistics, *Survey of Recent College Graduates*, report for 1991 survey.

Graduates with health, education, and engineering degrees are most likely to be employed in jobs related to their fields of study. Those with degrees in history, humanities, and social sciences are the most likely to be working in jobs that do not require a four-year degree.

Figure 15: Percentage of 1989-90 Graduates Employed Full-Time, Who Are Employed in Jobs Related to Field of Study, and Jobs Where a 4-Year Degree Is Not Required



Employment and Unemployment Trends

While the unemployment rate for four-year college graduates, one year out of school, ranged from 3 percent in 1985 to 5 percent in 1976 (and 4 percent in 1991), it seems to have mainly reflected the business cycle (see Figure 17). The rates are lower than the average rates for the whole population.

About three in four college graduates are working full-time one year after graduation. This is changed little from 1985 to 1991, although higher than the 67 percent working full-time in 1976 (a recession year) (see Figure 16). Since 1985, however, considerably more — from 23 to 35 percent — are continuing their educations (see Figure 18). More are working full-time and attending school.

Source: Data on full-time employment from *Digest of Education Statistics 1993*, National Center for Education Statistics, p. 396. Other data from National Center for Education Statistics, *Survey of Recent College Graduates*, report for 1991 survey.

The percentage of bachelor's degree recipients unemployed one year after graduation has varied with the business cycle. More have been continuing their schooling since the mid 1980s.

Figure 16: Percentage of Bachelor's Degree Recipients Employed Full-Time One Year After Graduation, 1976 - 1991

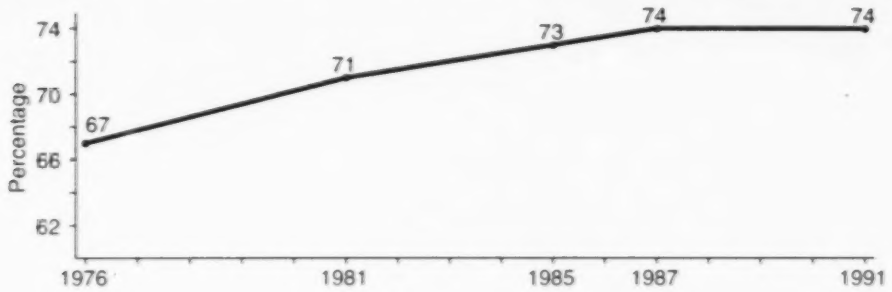


Figure 17: Percentage of Bachelor's Degree Recipients Unemployed One Year After Graduation, 1976 - 1991

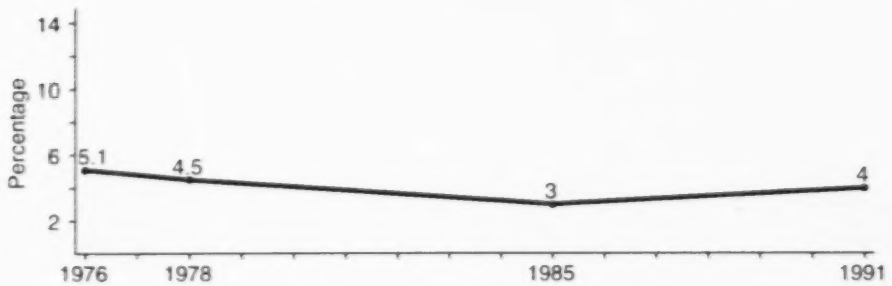
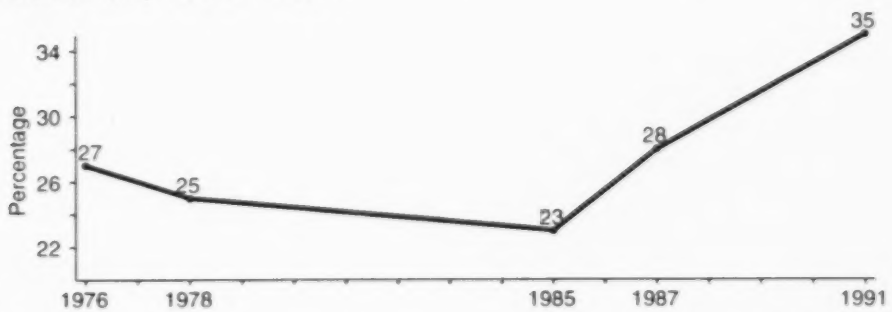


Figure 18: Percentage of Bachelor's Degree Recipients Enrolled in Further Education Sometime in Year After Graduation, 1976 - 1991



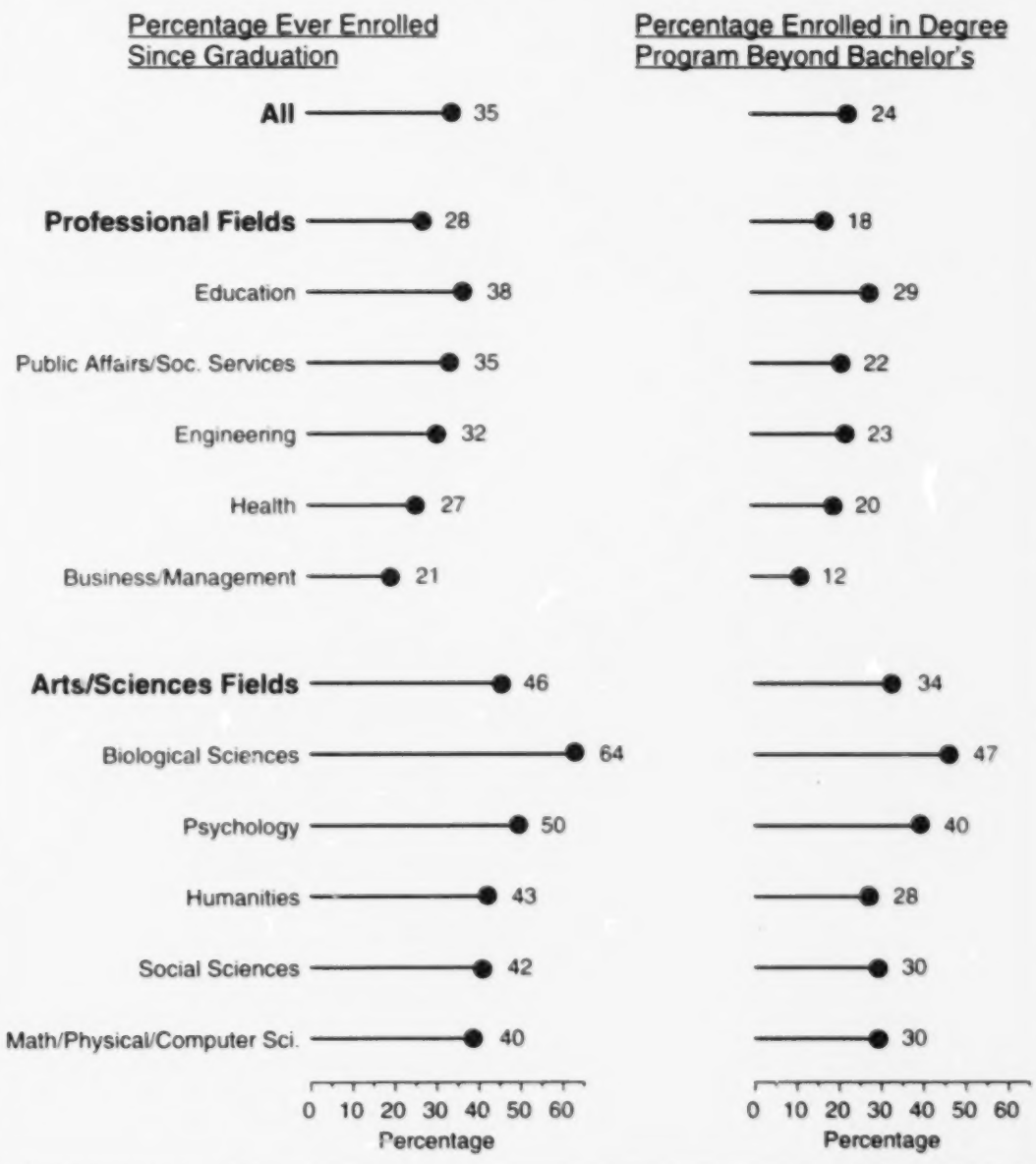
Continued Education, By Major

Figure 19 shows the proportion of four-year college graduates who continue their education within a year of graduating. It needs to be looked at in relation to Figure 14, which shows the percent employed. For example, those with degrees in biology are least likely to be employed full-time, but are most likely to be enrolled in further education. Business degree holders are most likely to be employed and least likely to continue their educations in the year after graduating.

Source: *Digest of Education Statistics*, 1993, National Center for Education Statistics, p. 398.

Recipients of bachelor's degrees in the biological sciences are most likely to continue their education and to enroll in advanced degree programs. Business and management degree holders are least likely to pursue further education.

Figure 19: Percentage of 1989-90 Bachelor's Degree Recipients Pursuing Further Education One Year After Graduation



Annual Salary

Average salaries, in constant dollars, have been fairly flat, for recent four-year college graduates over the last 15 years, varying from a low of $21,600 in 1976, to a high of $23,300 in 1987, slightly more than the 1991 average of $22,700 (see Figure 20).

In the ten-year period from 1981 to 1991, salaries of female graduates rose from 79 percent to 87 percent of male salaries. Salaries are close to equal in engineering, history, and psychology. They are lowest in social sciences, at 83 percent. These data are shown in Figure 21.

Source: National Center for Education Statistics, *Survey of Recent College Graduates*, report for 1991 survey.

Annual salaries, one year after graduation, of bachelor's degree recipients, have been fairly flat since 1976. Female salaries are 87 percent of male salaries (up from 79 percent in 1981), ranging from 83 percent in social sciences to 105 percent in history.

Figure 20: Annual Average Salary of Bachelor's Degree Recipients (Employed Full-Time), One Year After Graduation, 1976 - 1991, in Constant 1990 Dollars

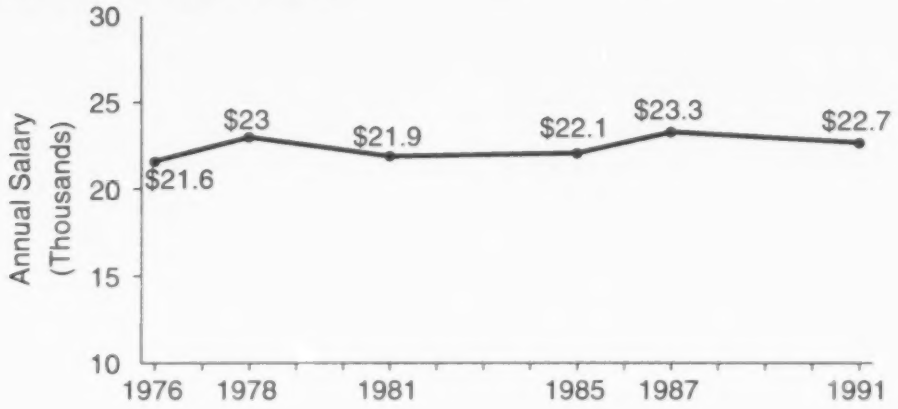
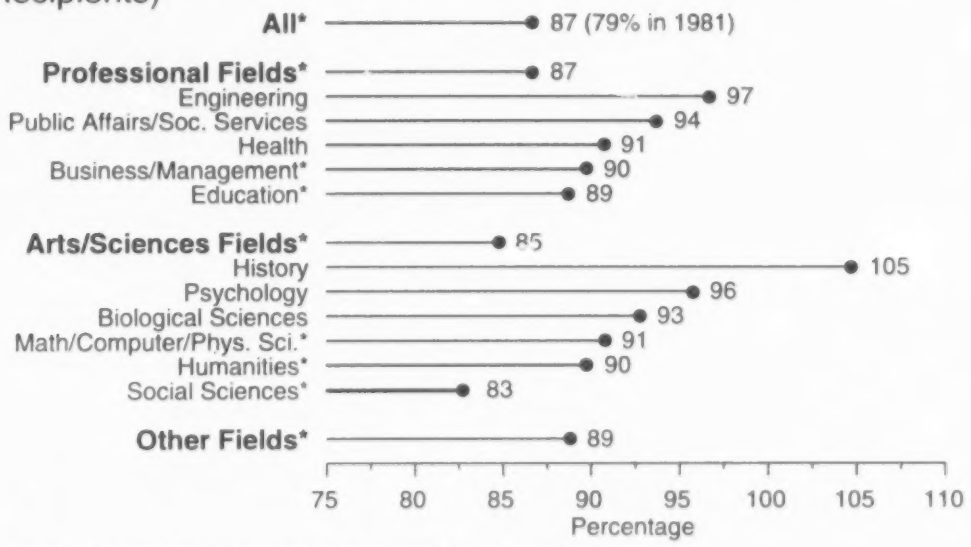


Figure 21: Female Salaries as a Percentage of Male Salaries (Employed Full-Time), 1991 (for 1989-90 Bachelor's Degree Recipients)



*Statistically significant difference at 95 percent confidence interval.

Salary By Major, 1976 to 1991

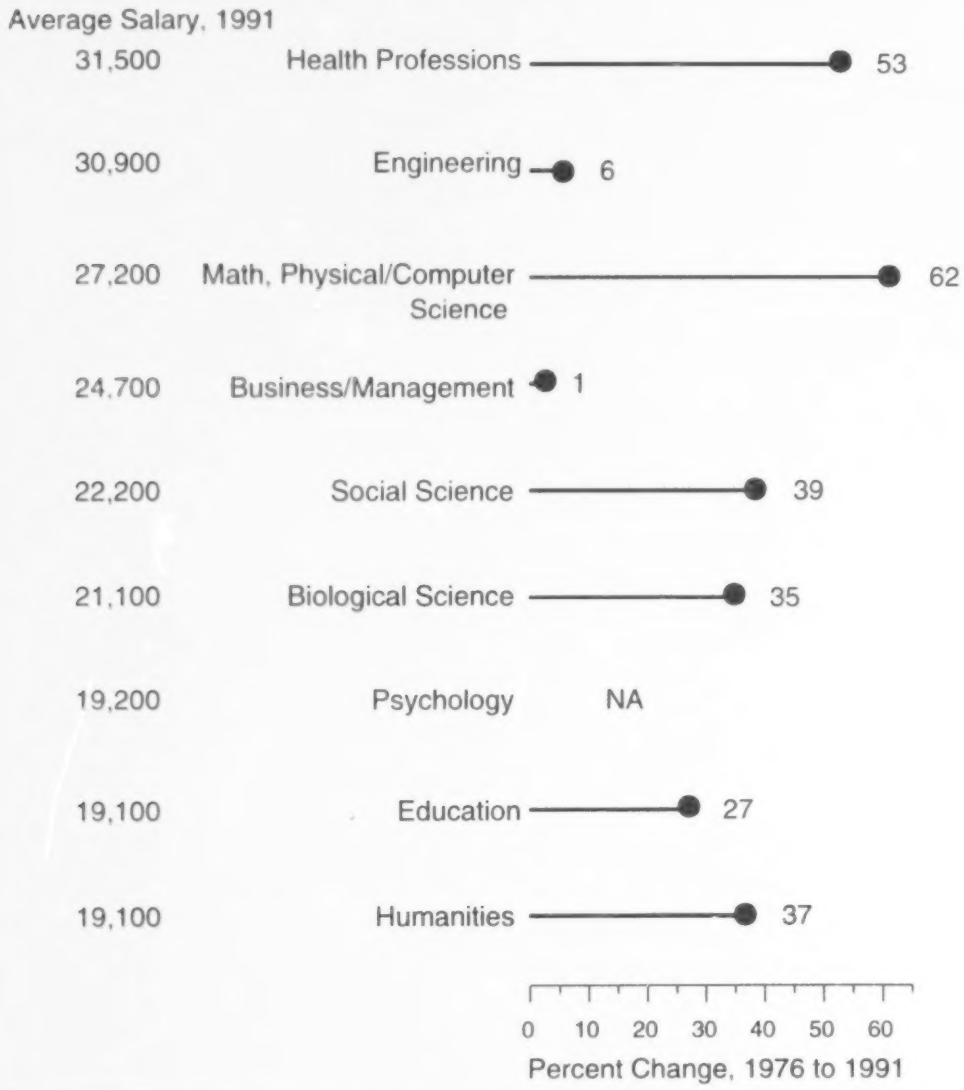
In 1976, the highest paid recent four-year college graduates had engineering degrees, and the lowest paid had education and humanities degrees. By 1991, the highest paid were in the health professions, with engineering second; education and humanities degree recipients were still the lowest paid (see Figure 22).

In 15 years, graduates with degrees in physical sciences, mathematics, and computer sciences had the greatest gain in real wages, 62 percent, followed by those with health professions degrees at 53 percent. The wages of graduates with business and management degrees stood still, and those of engineering graduates rose only 6 percent.

Source: *Digest of Education Statistics*, 1993, National Center for Education Statistics, p. 399.

Bachelor's degree recipients (1989-90) with health profession degrees had the highest salaries one year after graduation. Those with degrees in physical science, computer science, and mathematics had the largest percentage increase over 15 years.

Figure 22: Percent Change in Annual Salary of Bachelor's Degree Recipients, Employed Full-Time, One Year After Graduation (Constant 1991 Dollars)



Occupational Distribution by Major

Figure 23, shown on the next two pages, shows the extent to which those who major in a particular field get employment in that field one year after graduating from a four-year college. They also show the other fields in which they find employment.

Health and education majors are most likely to be employed in their fields of study, followed by engineering and math, computer science, and physical science majors. There are, of course, majors that do not lead specifically to an occupational field. For social sciences, history, psychology, and humanities majors, the largest percentage were employed in administrative occupations.

Source: National Center for Education Statistics, *Survey of Recent College Graduates*, report for 1991 survey.

Health education majors are the most likely to be employed in their major field of study.

Figure 23: Occupational Status of Employed 1989-90 Bachelor's Degree Recipients, by Major

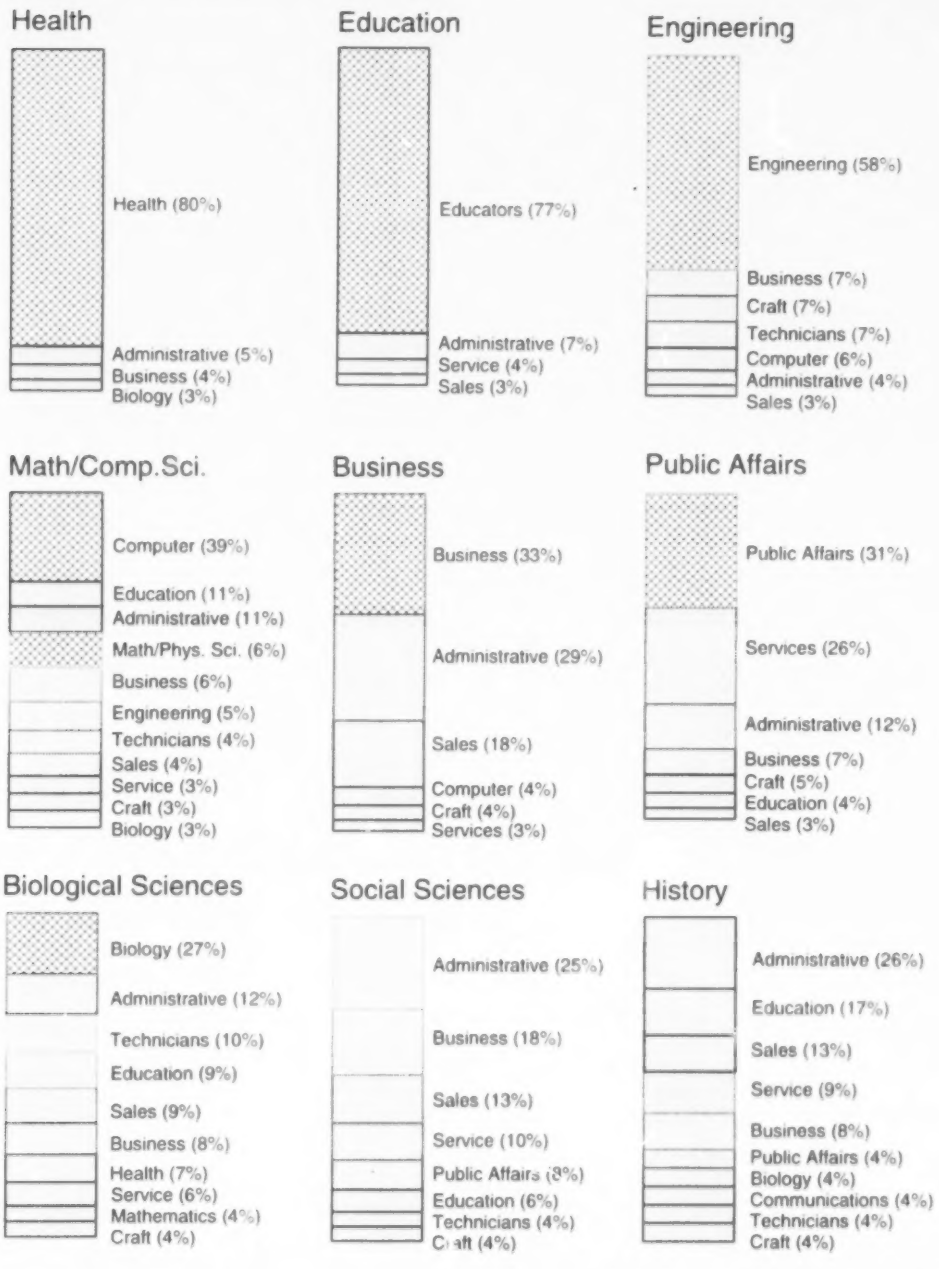


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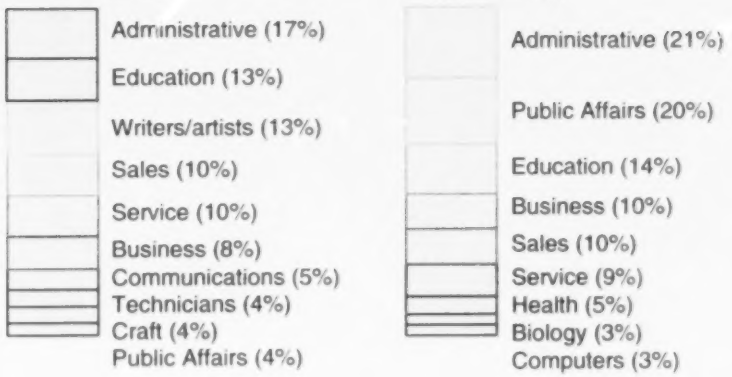
Figure 23 (continued)



TOWARD HIGHER EDUCATION INDICATORS

The preceding pages sum up what we know, in quantitative terms, about the results from, and effects of, higher education. While they provide a worthwhile view, they are only small windows into a very large house that has many rooms. To be sure, there has been a measurement movement in higher education, fueled by reports in 1986 and gaining wide attention, from the Education Commission of the States and the National Governor's Association's *Time For Results*. But emphasis has been largely on assessments used by individual institutions to measure progress and improve quality. Quality assessment, tailored to instructional needs at the classroom level, has been pressed consistently for nine years by the American Association of Higher Education. Where states required assessment, they left it up to each institution as to how to assess, except for Tennessee, which instituted a state-wide test. All this has left unsatisfied a growing demand for measurements that would permit generalizations about educational quality and progress within whole states... or the nation.

Some combination of forces have kept alive the question of whether there is a compelling need for some indicator system that would produce comparable results across higher education institutions. This was given focus in the national education goals set by President Bush and all the governors at the historic summit meeting in Charlottesville, Virginia in September of 1989. They set the objective that by the year 2,000:

> *The proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially.*

In the media attention that surrounded the announcement of the goals, and the creation of the National Education Goals Panel, this goal for higher education got little attention, either from the public at large or the higher education community. The focus was on K-12 education and adult literacy.

A Sample-Based Assessment System

The Goal 5 Resource Group, established by the National Education Goals Panel in 1990, reported to the Goals Panel that to monitor progress on this objective, "a new kind of assessment will have to be created." The Panel then created a "Technical Planning Subgroup" to explore the creation of such a measure. The subgroup came back to the Panel in June of 1991, with the report, "Indicators of General Education Outcomes of College Education." This Planning Group urged the creation of an assessment and indicator system, but also urged that the matter be approached with care, and with clear understanding of the pitfalls as well as the advantages. While believing that there are expected general outcomes of a college education, beyond specific subject matter, the report recognized:

- diversity of institutions and major programs
- diversity of views about the purposes of higher education
- diversity of students, in terms of backgrounds, age, objectives, and abilities as they enter higher education

The Planning Group recommended the creation of an assessment/indicator system

- that assesses a sample of graduates or seniors about to graduate, and the institutions these students attend
- that maintains confidentiality of results both with respect to students and institutions (however, samples could be so designed, or augmented, so as to provide information to a participating institution for its own use, if it is so desired)
- that draws samples and reports in such a way as to provide information by
  - the types of the educational institution, such as large research universities, small liberal arts colleges, four-year versus two-year colleges, etc.
  - the characteristics of the course of study followed by the students, and their majors
  - the characteristics of the students in terms of their backgrounds, their race/ethnicity, gender, whether they are U.S. or foreign students, and their skills and abilities when they entered school from such tests as the SAT and ACT
- that reports achievement and proficiency in the context of the ability levels of the students when they enrolled, so that the option exists for taking into account these differing entering ability levels

This group examined and rejected other approaches, *including the development of a standard for achievement, with reporting as to how many reached the standard*. Another Technical Group was created later for further development and while that group recommended advancing on the general lines described above, it recommended a standard-setting approach, similar to the "levels" now used in the National Assessment of Educational Progress. *We do not believe it is either desirable or feasible to establish such standards, and we agree that profiling proficiency will best serve the purposes of measuring progress for the Goals Panel and being a constructive force in higher education.*

Considerable work was undertaken subsequent to this report to the Goals Panel. The National Center for Education Statistics commissioned a series of papers by experts and held intensive workshops in 1992.* Out of all this came a request for proposals, issued by the U.S. Department of Education, to undertake the initial development work in the design of a sample-based assessment system. However, funds for this proved not to be available, and an award under the RFP was not made.

*See the *National Assessment of College Student Learning: Identification of the Skills to be Taught, Learned, and Assessed*, the National Center for Education Statistics, August 1994.

Indirect Measures of Outcomes

The Planning Group recognized the enormity of getting into place a sample-based assessment system. It also recommended that work proceed on indirect indicators "that could be collected from records now available or added to surveys, and that could serve to encourage educational progress in higher education." We report here of subsequent work undertaken by Peter Ewell and his colleagues, funded by the National Center for Education Statistics, to identify indirect measures of cognitive outcomes. We also report on an effort by the Community College Roundtable to identify indicators of the core mission of community colleges (which are not specifically directed toward cognitive outcomes).

Instructional "Good Practice" Indicators in Higher Education

Solid work has now been undertaken that could undergird a system of indirect indicators — proxy measures of general educational achievement.[1] They result from examining a large number of studies of the cognitive results of institutional and student practices and behaviors. Indicators of good practice were investigated in the following areas:

1. Institutional Requirements, such as graduation requirements or explicit demonstrations of competencies in subjects, having to write a major research paper, or a "capstone" experience such as an internship or senior thesis.

2. Instructional "Good Practices," such as "active learning," low class size, frequency of writing or speaking, frequency of contact with faculty members, or frequency of tutoring other students.

3. Student Behaviors and Self-Reported Gains, such as independent research, student reports of gains they have made in cognitive areas, reports of finding classwork challenging.

These areas, illustrated above by a few examples, served as a framework for the search for good practice indicators through a two-staged approach. First, there was a general search through research studies to identify promising ones, and second, there was an in-depth analysis of the studies identified. The pages that follow show the results of this ambitious and extensive effort in summary form. The summaries provided by the authors also describe the "available methods for collecting indicators data" for each of the indicators listed. For these, we refer the reader to the original report. The report also provides a bibliography of all the research studies used or consulted.

[1] A Preliminary Study of the Feasibility and Utility for National Policy of Instructional "Good Practice" Indicators in Undergraduate Education, prepared for the National Center for Education Statistics, by Peter T. Ewell, assisted by Cheryl P. Lowell, Paula Dressler, and Dennis P. Jones, of the staff of the National Center for Higher Education Management Systems, August, 1994.

Indicators of Effectiveness of Community Colleges

Another effort at identifying indicators of effectiveness was undertaken by the

SUMMARY CHART OF POTENTIAL "GOOD PRACTICE" INDICATORS

Indicator Domain/ Dimension	Relative Strength of Association with Goal 5.5 Outcomes	Available Methods for Collecting Indicators Data	Relative Ease of Data-Gathering	Policy Relevance	Overall Potential
A. Institutional Requirements:					
Broad General Education Curriculum/Requirements	Weak/Moderate	- Catalogue Review - Institutional Questionnaires/ Inventories (e.g., Peterson 1987)	Difficult	High	Low
Breadth of Coursetaking/ Types of Coursetaking	Moderate	-"Breadth" and "Depth" of Courses Taken (Zemsky 1989) - "Differential Coursework Methodology" (Ratcliff & Associates 1988)	Moderately Difficult	Moderate	Moderate
Special Courses/ Instructional Designs	Moderate (but likely derivative)	- Catalogue Review - Institutional Questionnaires/ Inventories (E.G., Gamson & Poulsen 1989)	Difficult	Low	Low
Levels of Expectation	Moderate/Strong (via association with "Small Liberal Arts College" effect)	- rating examinations and course materials by level of difficulty (e.g., Braxton & Nordvall 1985)	Difficult	Moderate	Moderate
B. Instructional "Good Practice":					
Class Size and Structure	Low/Moderate (but likely derivative)	- Institutional Survey/Statistics	Moderately Difficult	High	Moderate
"Active Learning" practices in class - Practice of Skills - Frequent Feedback - Peer Interaction	 Strong Strong Strong	- Faculty Surveys e.g., 7 Principles Survey (Gamson & Poulsen 1989), UCLA Faculty Survey - Student Surveys e.g., CBEQ (Pace 1987) CIRP (Astin & Associates 1992)	Not difficult	Moderate	High
Wider Institutional Environment					
- Involvement	Strong/moderate (complex interaction of factors)	- CSEQ (Pace 1987) - CIRP (Astin & Associates 1992)	Not difficult	Moderate	High
- Student/Faculty Contact	Strong/moderate (but also may require data on nature of interaction)		Not difficult	Moderate	High
C. Student Behavior:					
Time on Task	Strong/Moderate (but also requires quality of investment measures)	- CSEQ (Pace 1987) - CIRP (Astin & Associates 1992)	Not difficult	Moderate	High
"Quality of Effort"/ Involvement and Investment	Strong	- CSEQ (Pace 1987)	Not difficult	Moderate	High
D. Self-Reported Cognitive Development:					
	Moderate/Strong	- CSEQ (Pace 1987) - CIRP (Astin & Associates 1992) - ACT-ESS (ACT 1982) - NCHEMS SOIS (NCHEMS 1983)	Not difficult	N/A	Moderate

Source: *A Preliminary Study of the Feasibility and Utility for National Policy of Instructional "Good Practice" Indicators in Undergraduate Education*, prepared for the National Center for Education Statistics, U.S. Department of Education, p. 36-38.

Community College Roundtable.* The principal purpose of the Roundtable's report is to suggest a set of indicators an individual college could use to gauge its effectiveness. It is conceivable, however, that widespread use and adoption could permit aggregation to a set of colleges, or to whole states. The indicators deal with "the major mission tasks that a community college must accomplish to be successful." They do not deal with all aspects, nor address specific student learning outcomes.

A very brief summary of the indicators is provided below.

Student Progress:
Student Goal Attainment
Persistence (Fall to Fall)
Degree Completion Rates

Career Preparation:
Placement Rate in the Workplace
Employer Assessment of Students

Transfer Preparation:
Number and Rate Who Transfer
Performance After Transfer

Developmental Education:
Success in Subsequent, Related Coursework

General Education:
Demonstration of Critical Literacy Skills
Demonstration of Citizenship Skills

Customized Education:
Client Assessment of Programs and Services

Community Development:
Assessing Responsiveness to Community Needs
Participation Rate in Service Area

The report provides a measure for each indicator, the data sources, and additional or alternative measures.

*_Community Colleges: Core Indicators of Effectiveness_, a report of the Community College Roundtable, published by the American Association of Community and Junior Colleges, 1994. The quote is from the Preface, written by Richard Alfred, Paul Kreider, and Kay McClenney.

CONCLUSION

As we said at the outset, these data provide only a limited view of certain aspects of higher education. The data are solid, however, particularly the results that derive from tests, the literacy assessment, and statistical series. We can have confidence in what they do tell us.

With regard to the synthesis of small-scale research studies, there is strong evidence that college has a positive effect on verbal and quantitative skills. Also, there is moderate to strong evidence of a positive effect on critical thinking, although the magnitude is unclear. There is also moderate evidence of a positive effect on oral and written communication and general intellectual and analytical skill development, although the magnitude of the effect is also unclear.

Quantitative and Analytical scores rose on the Graduate Records Examination from 1981 to 1993, with the volume of test takers up almost by half (Verbal scores were stable). In the same period, scores on subject matter tests rose in eight subjects and fell in seven. In four of the tests where scores increased, the number of test takers also increased. Scores have risen on the Graduate Management Admissions Test as well.

Three-fourths of two- and four-year college graduates (born in the U.S. or its territories) scored in the third and fourth highest levels of literateness on a national assessment given to a household sample of all adults age 16 and over. We ask the reader to look at these literacy levels in terms of what adults at those levels can do, and make their judgments about whether the performance of college graduates meets their expectations. While these skill levels are not negligible, neither do they seem to the authors to be impressive. And performance is lower for the *older* college graduate population. At least in the area of literateness, as this assessment measures it, it is hard to disagree with what Alexis DeToqueville said long ago, that "A middling standard is fixed in America for human knowledge. All approach as near to it as they can, some as they ascend, others as they descend." But we don't know why younger graduates perform better than older ones.

If you judge Level 3 to be below what you would expect for four-year college graduates, then it is important to note that just over half are at Level 4 or 5.* Only 11 percent are at Level 5.

Leaving out the effects of aging, 8 percent of four-year college graduates under age 25 are at Levels 1 and 2 (mostly at Level 2) as are 18 percent of two-year graduates (also, mostly in Level 2). Few would disagree after reading page 29 that the Prose capabilities of people at this level are fairly low.

We must remind ourselves that these data have only limited direct relationship to the objectives of higher education. Colleges and universities do not have courses based on this assessment of literateness. Most probably assume literacy — or their definition of it — as an essential characteristic of their applicants.

*Born in USA or its territories.

Universities were established to form preachers of the gospel, to train civil servants, to prepare teachers, and to hone the skills of engineers and surgeons. The early theologians, philosophers, and seekers of truth have become today's researchers and scholars.

Nevertheless, we suspect that if you ask the man or the woman on the street whether people who graduated from college should be able to do the tasks in, say Levels 4 and 5, they would likely answer yes. While these are the tasks people encounter in daily life, many involve problem solving; the context for such tasks should not be critical, as these skills are supposed to be transferrable from one context to another. However, literacy assessment is not designed to be an assessment of higher education outcomes, and any measures used directly for that purpose should be developed through a process of purposeful development and consensus building.

We hold out the expectation that a college degree will result in success in the employment world. Indeed, higher education is the only well established route for the transition from school to work in the United States. Of course, college graduates, on average, do better financially than those without degrees; high school graduates have been losing ground in terms of real wages in the last couple of decades. Annual salaries of four-year graduates (one year after graduation) were just a little higher, in constant dollars, in 1991 than in 1976, and a little lower than in 1978; yet the cost of getting that college degree has risen sharply since 1976.

The percent of graduates employed full-time a year after graduation has risen from 67 percent in 1976 (a recession year) to 74 percent in 1987 and 1991, at the same time that the percent enrolled in further education has grown from 27 percent in 1976 to 35 percent in 1991 (after dipping to 23 percent in 1985). Many of these are part-time enrollments.

The percent of graduates who are employed a year later in jobs not requiring a four-year degree rose from 37 percent in 1985 to 44 percent in 1991, although the percent in jobs related to their field of study has held steady at over 75 percent. Over long stretches there has been a trend in which during each decade more college graduates take jobs that were held by those with less than a college degree the prior decade. Thus, the perception of whether a job requires a college degree changes over time, and the statistics reflect these shifting perceptions, as they come from the graduates themselves.

Not unexpectedly, salaries vary considerably for recent college graduates, as does the change in salaries over time. Those with degrees in the health professions were the highest paid, earning an average of $31,500 in 1991. This is 53 percent higher (in constant dollars) than 1976. They surpassed engineers, at $30,900, whose wages grew by just 6 percent. The lowest paid were those with degrees in education and the humanities, at $19,100, and growth rates of 27 percent and 37 percent, respectively. Those with degrees in business and management increased only 1 percent. The largest growth was 62 percent for those with degrees in the physical sciences, mathematics, and computers. Market demand shifts, and salary levels adjust accordingly.

* * *

No sweeping statements about the state of higher education, or whether quality is improving overall or not, are possible from the data available. Some useful knowledge about particular aspects is available. Do we need to know more?

The demand for better information will likely get stronger, as finances are constrained, costs rise with inflation in the higher education sector, and concern for economic competitiveness mounts. Also, the education reform movement keeps the spotlight on quality... and a quality movement... Total Quality Management... spreads throughout the economy. The nation's governors, the President, and now the U.S. Congress, have set a goal for the year 2000 for higher education, for which progress cannot now be measured.

Good quantitative information will help all involved make better choices. But, as discussed earlier in this report, quantitative information alone is insufficient for judging whether higher education is fulfilling all of its many stated purposes. Efforts recently begun show promise of a thoughtful and constructive beginning. With enough resolve, full implementation could continue:

- A follow through on creating a sample-based assessment to produce indicators of critical thinking, problem solving, and effective communication. The effort of the National Center for Education Statistics was aborted because of lack of funding.

- A parallel effort, creating indicators of good practice, based on solid research on the relationship of such practices to cognitive outcomes. This work has been carried a long way by Peter Ewell and his colleagues. Also, the Community College Roundtable has agreed on indicators of effectiveness for community colleges.

America may now have the best higher education system in the world. The question though is whether it is as good as it can be and as good as we want it to be, and whether it is realizing the potential embedded in the vast resources devoted to it. The commitment to measure results and the commitment to act are likely interwoven. A narrow-minded view of what constitutes good information would not reflect critical thinking in a nation dedicated to the broadening of minds through liberal education. Properly developed and sensibly used, however, a good system of indicators can help higher education improve individual opportunity and well being, as well as make the U.S. a stronger nation.

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